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# *Workplace Project Portfolio*

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# Preface

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## Student's Role

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The DRIVE study consisted of 2 phases, an initial survey which was conducted in 2003-2004, and a follow-up survey conducted approximately 2 years later. The cleaned baseline survey data and unclean resurvey data were provided to me as a SAS dataset.

The dataset was then converted into Excel, where cleaning and coding of variables took place. Cleaning and coding was done in this format because the dataset was extremely large, and it allowed for simple removal of unwanted covariates and facilitated easy conversion of missing data into the STATA missing format. Following this, data were imported into STATA for labelling and analysis. I conducted all analyses. The analyses were conducted between July and November 2008.

Specific roles were:

- Discussing the problem, and determining the best approach to address these
- Cleaning the dataset
- Coding the dataset
- Conducting the analyses
- Discussing the best approach based upon the initial models
- Reporting the results
- Discussing the results
- Writing the report

## Reflections on Learning

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### Communications skills

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During this project, I discovered the difficulties of acting in a “consultant” statistician role, i.e. not being on-site with the project team. This makes the style and timing of communication critically important. Face to face meetings are useful for clarifying modelling techniques etc; however email communication with attached output appears to be a better method of clarifying the finer points. However, the latter style relies on prompt responses from both parties – something that is difficult with conflicting schedules and multiple competing projects.

### Work patterns / planning

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Ideally a project like this could be completed quite quickly – if all the information is available, and the team members are able to communicate easily.

There were several phases to this project. An initial meeting was held to discuss the dataset to be analysed – how the information was collected and how the dataset was coded. Two other face-to-face meetings were held to discuss the most appropriate type of analysis to answer the questions posed.

All other communication occurred via email – from discussions around the initial modelling, to discussing the final report.

### Statistical principles & methods

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Initially two problems were posed – wanting to predict resurvey scores from baseline data, and secondly, exploring factors that influence the change in scores from baseline to resurvey. In consultation with my statistical supervisor, Serigne, it was agreed that the first problem was best addressed using a linear regression approach, whilst the second problem be addressed using an ANCOVA approach.

Initial modelling of the second problem led us to abandon this approach, and concentrate on the linear modelling approach.

The Linear Modelling (LMR) course from the BCA was particularly helpful in assisting me on determining the best approach for modelling, the mechanics of conducting the analyses in STATA, and also the best method of performing diagnostics on the model.

## Statistical computing

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All computations were performed using STATA, based upon knowledge I obtained from the Linear Modelling course of the BCA.

## Teamwork

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### Communication with other team members

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Communication with other team members (Soufiane Boufos, Segine Lo and Alex Martiniuk) occurred either via face-to-face meetings or via email. Initial discussions involved determining the appropriate type of modelling to answer the questions posed, and which covariates could be of potential importance. Email discussions aided in refining the models chosen and ensuring the direction was consistent with the requirements of The George Institute for International Health.

### Negotiating roles and responsibilities

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Following the initial discussions, all statistical analyses were performed by me, under consultation with the rest of the project team.

### Working within timelines

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Timelines were difficult for this project, not because of any timeline imposed by The George Institute, but because I had a baby in the middle of it!! That said, sometimes it was difficult (both ways) to receive prompt answers to questions – partially because I do not work at The George Institute, and partially because of my conflicting responsibilities at present. Obviously, from The George Institute's perspective, completing workloads would have been an issue.

## Helping others to understand statistical issues – teaching

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One of the contentious issues in this modelling was how to handle the baseline data. I wanted to include the baseline data as a covariate within my linear regression model to reduce the effect of regression towards the mean. The rest of the team were keen to use change scores. Following some discussions it was agreed to use the baseline covariate method.

## Ethical considerations

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### NHMRC ethics guidelines

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The DRIVE study was approved by the Human Research Ethics Committee at the University of Sydney and the New South Wales Health Ethics Committee (approval numbers 2688 (02/02/24)). An introductory letter about the study was sent from the NSW Roads and Traffic Authority was mailed to all potentially eligible participants. This letter confirmed that participation was voluntary, and that a cinema voucher would be provided to reimburse participants for their time.

All participants provided informed consent. This consent allowed participant data to be linked to their traffic accident data, licensing details and driving offence data held by the RTA, as well as information held by the NSW Department of Health on injuries sustained in motor vehicle crashes.

All data within the database provided to me was in a de-identified format.

### Confidentiality Issues

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I received data in a de-identified format, following the signing of a confidentiality agreement.

### Professional responsibility

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The project undertaken was within the guidelines of the Code of Conduct of the Statistical Society of Australia. In particular, the work was carried out with due care in accordance with the requirements of The George Institute and the confidentiality of the data were respected.

## Change in Knowledge and Skills

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This project has enabled me to “taste” what it is like being a consultant, external statistician on a project. It has taught me time management skills, negotiation skills, and obviously improved my statistical computing skills. It has also taught me that you need to be very specific in addressing your questions, and persistent in follow-up when working remotely from the project. Finally, it has taught me that attention to detail is very important – to ensure that the analysis produced is appropriate and includes all relevant and correct data.

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# *Project Report Front Sheet*

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**Project Title:** Determining predictors of resurvey score of Risk Perception, Risky Driving Behaviour and Sensation Seeking in a cohort from the DRIVE study.

**Location:** The George Institute for International Health, Sydney

**Dates:** July to November, 2008

**Context:** The DRIVE study is being conducted by The George Institute for International Health. While the primary focus of this dataset is to determine risk factors for serious injury and death in a cohort of young drivers, the dataset provides the opportunity to establish risk factors for a number of outcomes. To this end, The George Institute required some modelling to be conducted to determine factors responsible for predicting changes in risk perception, risky driving behaviour and sensation seeking. Soufiane Boufous was the main supervisor, providing direction and proposing the problems that required analysis. Serigne Lo was the statistical supervisor providing statistical advice, and supervision. Alexandra Martiniuk and Teresa Senserrick provided guidance and review.

**Contribution:** My contribution was as follows:

- Discussing the problem, and determining the best approach to address these;
- Cleaning the dataset;
- Coding the dataset;
- Conducting the analyses;
- Discussing the best approach based upon the initial models;
- Reporting the results;
- Discussing the results; and
- Writing the report

**Statistical Issues:** Initially 2 problems were posed, the requirement for a predictive model to determine factors that predict resurvey scores for risk perception, risky driving behaviour and sensation seeking (reported here) and a second explanatory model exploring factors that influenced changes in risk perception, risky driving behaviour and sensation seeking. The first problem was modelled using linear regression, while the second was modelled using an

ANCOVA approach. Initial modelling led us to abandon the second approach due to lack of fit and greater interest in the first problem. A linear modelling approach was believed appropriate for the predictive model because the outcome was continuous and closely followed a normal distribution. Furthermore, it provides a simple equation that can be used to predict scores at resurvey. Regression to the mean was addressed by using baseline scores as a covariate.


The major statistical issue in this project was the sheer volume of data that had been collected, and managing this. Additionally, the initial dataset was in SAS, whilst I use STATA for analyses, so the dataset had to be converted, re-coded and checked again.

**Declaration:** I declare this project is evidence of my own work, with direction and assistance provided by my project supervisors. This work has not been previously submitted for academic credit.

Signed: \_\_\_\_\_ Belinda Butcher

**Supervisor Statement:**

I declare that Mrs Belinda Butcher has worked alone on this project under the conjoint supervision of Drs Soufiane Boufous, Alexandra Martiniuk and myself as the statistics supervisor. She was actively involved in the evolution of this project. This work has not been previously submitted for publication or academic credit. To my knowledge, Belinda's involvement and effort on this project is highly satisfactory for the requirements of the BCA Workplace Project.

Signed:  \_\_\_\_\_ Dr. Serigne Lo

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# Project Report

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*Performed in conjunction with  
The George Institute for International Health, July – November 2008*

## Project Description

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### Background, rationale for project

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The 2008 Year Book [1] released by the Australian Bureau of statistics notes that young drivers are disproportionately represented in road traffic accidents. In 2004-2005 (the year surveyed), people aged 15-34 were injured in road traffic accidents at approximately twice the rate of the rest of the population. Road traffic accidents are a major cause of death and disability, and as such, it is an important public health initiative to try to determine why young people are at greater risk of involvement in road traffic accidents, and secondly to seek to implement strategies to reduce their over-representation in crash statistics.

Several risk factors for car crashes in young people have been identified in the scientific literature, including: driving at a young age [2]; having little driving experience [3]; being male [4]; driving after drinking alcohol [3]; driving at night [5, 6]; carrying passengers [7-9]; having greater involvement in risk taking behaviour [10]; excitement (sensation) seeking behaviour [10] and altered risk perception [10]. There is evidence to suggest that there is a relationship between sensation seeking and risky driving in young people (for review see Jonah, 1997 [11]). Additionally, risky driving in young, inexperienced drivers is associated with an increased risk of having an accident [10]. However, to date, no research has specifically examined the impact of various factors, including driving offences and crashes on a young driver's risk perception or risky driving over time.

## Aim

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The overall aim of the DRIVE study is to investigate the risk factors for injuries due to motor vehicle crashes in young drivers.

The aims of this Workplace Portfolio Project are:

1. To build a prediction model for risk perception score at DRIVE resurvey using DRIVE baseline covariates plus self-reported crash information between baseline and resurvey;
2. To build a prediction model for risky driving behaviour score at DRIVE resurvey using DRIVE baseline covariates plus self-reported crash information between baseline and resurvey;
3. To build a prediction model for sensation seeking score at DRIVE resurvey using DRIVE baseline covariates plus self-reported crash information between baseline and resurvey;

## Design

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The DRIVE study is a longitudinal, prospective, cohort study designed to investigate the risk factors for injuries due to motor vehicle crashes in young drivers. Initially 20,822 young drivers in New South Wales responded to the baseline survey which was sent to all eligible drivers (drivers aged 17-24 years holding their first-stage provisional motor vehicle driver's license from NSW) between June 2003 and December 2004. A follow-up questionnaire was sent to a random sample of around 5,000 participating drivers approximately 2 years later (there were 2,991 respondents to the follow-up survey). The survey contains questions about demographics, ethnicity, driving experience and training, risk perception, driver behaviour, lifestyle habits (including alcohol and marijuana use), sensation seeking, mental health and sleep habits. The methodology of the trial has been published previously [12]. Data linkage between survey data and driving offences, car crash, injury and death databases held in NSW by various agencies (NSW Police, NSW Roads and Traffic Authority, and NSW Health) provides driving outcomes that are independent of the survey participant's self-report.

## Baseline Survey

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The baseline survey was designed to be completed in 15 to 20 minutes and included questions about possible risk factors for injuries in young drivers: demographics, driving experience, driving instruction and training, lifestyle, driving habits and opinions, and mental health status. The survey was designed using questions obtained from the Australian Bureau of Statistics (demographics); the Western Australian Young Driver Cohort Study (driver training and exposure); the University of Otago Young Driver Study (driver training and exposure); the Centres for Disease Control and Prevention's Youth Risk Behavior Surveillance System (drugs, alcohol, and risky driving); the University of Colorado's Risky Driving Questionnaire (drugs, alcohol, and risky driving); and the Roads and Traffic Authority Pre-Driver Attitudes Survey (drugs, alcohol, and risky driving).

## Resurvey

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The resurvey was administered to a random sample of 5,000 original participants and included questions on driving experience (including crashes and offences); driving habits and opinions; lifestyle and mental health status. The response rate to the resurvey was 2,991 participants (60%), and it was administered between 10 and 39 months after the baseline survey.

Copies of the Baseline and Resurvey Questionnaires can be found in the Appendix.

## Survey Items and Scoring

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Of the survey items administered, a number were considered potentially important influences on risk perception, risky driving behaviour or sensation seeking, and these were chosen for further analysis. These variables of interest included:

- Age
- Sex
- Marital status
- Living with parents
- Occupation

- Whether or not the participant is Indigenous
- The number of times they drove a car on the road without a licence before they received their learners permit
- Age at first driving
- Whether they have had a licence before
- Whether they have had professional lessons
- Whether or not they have had unprofessional lessons
- Whether or not they have attended practical driver training
- Whether or not their car is modified
- Their AUDIT score
- Their licensing rating
- Their general rating
- Alcohol use in previous 4 weeks
- Marijuana use in previous 4 weeks
- Whether or not they have been involved in a car crash before
- Kessler score
- Baseline risk perception score
- Baseline risky driving behaviour score
- Baseline sensation seeking score
- Whether or not they have been involved in a crash between baseline and resurvey

Demographic items were based upon the Australian Bureau of Statistics standard demographic items.

A brief description of each of the covariates of interest that require explanation is provided below.

### AUDIT score

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Alcohol use was measured using a three item subscale of the Alcohol Use Disorders Identification Test (AUDIT)[13, 14], and were categorised into low risk and high risk participants.

The questions relevant to this item can be found as Questions D1 to D3 in the DRIVE Questionnaire (Appendix 2).

### Their licensing rating

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Participants were asked to rate their driving ability compared to other drivers at the same stage of licensing as themselves on a 5-point scale from much worse to much better.

The questions relevant to this item can be found as question D7 in the DRIVE Questionnaire (Appendix 2).

### Their general rating

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Participants were asked to rate their driving ability compared to other drivers in general on a 5-point scale from much worse to much better. The questions relevant to this item can be found as question D8 in the DRIVE Questionnaire (Appendix 2).

### Kessler score

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The Kessler-10 is a measure of psychosocial distress, consisting of 10-items regarding anxiety and depressive symptoms in the previous 4-weeks [15]. For each of the 10-items there is a 5-level ordinal scale based upon the amount of time the respondent experienced the particular symptom in the preceding week, ranging from 1-none of the time to 5-all of the time. Kessler-10 scores range from 10 to 50, with low scores indicating low levels of psychological distress.

Scores were then categorised into Low (Kessler-10 score 10-15); Moderate (Kessler-10 score 16-21); High (Kessler-10 score 22-29); or Very High (Kessler-10 score 30-50) as per the Australian Bureau of Statistics recommendation [16].

The questions relevant to this item can be found as question D14 in the DRIVE Questionnaire (Appendix 2).

### Whether or not they have been involved in a crash between baseline and resurvey

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This dichotomous variable included reporting crashes whether they occurred on-road or off-road.

The questions relevant to this item can be found as question A9 in the DRIVE Resurvey Questionnaire (Appendix 2).

### Risk Perception Score

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The Risk Perception score item was adapted from surveys by Donovan and Jessor [17] and Begg and colleagues [18] was calculated as a composite score from 10 questions on risk perception. For each item, there was a 4-item response scale (

Table 1).

**Table 1: Risk Perception Item Scoring**

Response	Score
Always safe	3
Mostly safe	2
Sometimes safe	1
Rarely safe	0

The composite score for risk perception therefore had values between 0 and 30, with lower scores representing more positive road safety views while higher scores represent poorer road safety views.

The questions relevant to this item can be found as question D6 in the DRIVE Questionnaire (Appendix 2).

### Risky Driver Behaviour Scores

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The Risky Driving Behaviour items were based upon a modified "Risky Driving Scale" of the Young Adult Driving Questionnaire [17] and the New Zealand Drivers Study [18]. The Risky Driving Behaviour score was calculated as a composite score from 14 questions on risky driving behaviour. For each item there was a 5-item response scale (Table 2).

**Table 2: Risky Driving Behaviour Item Scoring**

Response	Score
Very often	4
Often	3
Sometimes	2
Hardly ever	1
Never	0

The composite score for Risky Driving Behaviour therefore had values between 0 and 56, with lower scores indicating a person engages in less risky driving behaviour.

The questions relevant to this item can be found as question D11 in the DRIVE Questionnaire (Appendix 2).

### Sensation Seeking Score

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The sensation seeking items of the survey were from the Impulsive Sensation Seeking Scale (ImpSS)[19], which also has proven validity and reliability [20].

The Sensation seeking score was calculated as a composite score from 19 questions on sensation seeking behaviour. For each item there was a dichotomous scale (Yes or No; Table 3).

**Table 3: Sensation Seeking Item Scoring**

Response	Score
Yes	1
No	0

The composite score for sensation seeking therefore had values between 0 and 19, with lower scores indicating a person participates in less sensation seeking behaviour.

The questions relevant to this item can be found as question D13 in the DRIVE Questionnaire (Appendix 2).

### Ethical Issues

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The DRIVE study was approved by the Human Research Ethics Committee at the University of Sydney and the New South Wales Health Ethics Committee

(approval number 2688 (02/02/24)). An introductory letter about the study was sent from the NSW Roads and Traffic Authority was mailed to all potentially eligible participants. This letter confirmed that participation was voluntary, and that a cinema voucher would be provided to reimburse participants for their time.

All participants provided informed consent. This consent allowed participant data to be linked to their traffic accident data, licensing details and driving offence data held by the RTA, as well as information held by the NSW Department of Health on injuries sustained in motor vehicle crashes.

## Data Management

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### Obtaining data

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Data were provided by The George Institute as a SAS dataset. Data were converted to a STATA 9 dataset (StataCorp LP, College Station, Texas, USA) using Stat/Transfer (Circle Systems, Inc, Seattle WA, USA).

### Data cleaning

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The baseline data set had already been cleaned by the team at The George Institute of International Health, using values chosen by that team. This was achieved by recoding as missing any extreme or unlikely values, e.g. when:

- the number of dependent children was greater than or equal to 17;
- the number of unprofessional driving lessons on gravel roads was greater than or equal to 2000 or equal to -239;
- the number of unprofessional driving lessons occurring while it was raining was greater than or equal to 2000;
- the number of unprofessional driving lessons occurring while it was dark was greater than or equal to 2000;
- the number of unprofessional driving lessons occurring in heavy traffic was greater than or equal to 2000;
- the age of the person who taught the participant how to drive was greater than or equal to 0 but less than or equal to zero.

I cleaned the resurvey data. This involved checking for extreme or unlikely values, and recoding these as missing:

- when the number of driving convictions was greater than or equal to 600 (2 data points changed to missing).

## Imputation of Missing Values

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Missing data were not imputed. Analyses were carried out only amongst those with valid values for all covariates. There should be relatively little effect on the estimators when conducting a “complete-case-analysis” because there were so few missing data points (<2.5%).

## Statistical Methods

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### Statistical Issues

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Initially, a two-pronged approach to the modelling was discussed. This involved looking at predictors of risk perception, risky driving behaviour and sensation seeking scores at resurvey, using a linear modelling approach (as described below); along with an explanatory ANCOVA model including re-survey covariates to look at risk factors for changes in risk perception, risky driving behaviour and sensation seeking. It was decided, following some preliminary modelling, that the ANCOVA approach would be dropped and we would focus instead on the predictive modelling. The reasons for dropping the ANCOVA approach were: poor model fit, and greater interest in the predictive modelling (rather than the ANCOVA explanatory modelling). See Appendix 1 for further details of the abandoned approach.

### Statistical Method & Justification

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#### Descriptive Statistics

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Descriptive statistics were computed for all variables. For continuous variables, this included calculation of mean, median, minimum, maximum and standard deviation. For categorical variables, counts and percentages were produced.

Descriptive statistics for each outcome of interest (risk perception, risky driving behaviour and sensation seeking at resurvey) were then computed, stratified by each variable of interest.

## Univariate Analyses

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Univariate regression models were produced to assess the inter-relationship among variables and to inform future multivariate analyses.

## Regression Modelling

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A multivariate linear regression model was produced to determine predictors in the outcomes of interest i) risk perception, ii) risky driving behaviour and iii) sensation seeking score at resurvey. Broadly speaking, the multivariate approach was favoured over a univariate approach because a single predictor variable would have provided an inadequate prediction of resurvey scores.

Additionally a multivariate linear regression model approach was chosen because we were trying to determine the relationship between the multiple covariates of interest and risk perception, risky driving behaviour or sensation seeking score at resurvey.

Multivariate modelling was carried out using multiple linear regressions. Linear regression was chosen because the outcome of interest was continuous, and was expected to have a symmetric (normal) distribution.

Model building was performed by carrying out univariate analysis for factors of interest (see descriptive statistics, above). Factors that had p-values less than 0.2 were then included in the model. Other factors were discarded from the modelling process, except the baseline score for the predicted outcome (e.g. for the risk perception model, baseline risk perception score would be retained even if it returned a p-value greater than  $p=0.2$ ). This was done to address issues of regression to the mean in preference to predicting change scores, which are problematic in this regard [21].

Regression to the mean is an issue when interpreting the data on changes in score from baseline to resurvey in an individual. Using change scores (subtracting the initial score from the follow-up score) has been proposed as an alternate method for dealing with pre- and post-data, at least in the randomised clinical trial setting, however, this is not recommended [21]. Analysis of covariance, or the inclusion of the baseline score in the regression is the preferred method for dealing with the issue of regression to the mean [22]. The inclusion of the baseline score in predictive modelling, should, at least in theory, improve the accuracy of the predictive model.

The relationship between the outcome of interest and the chosen covariates of interest were explored graphically, and then an exploratory fit using a simple first-order model and all potential covariates was conducted. The model specification was checked using STATA's inbuilt specification tests: a model specification link test (to determine whether any additional independent variables are significant, except by chance) and a Ramsey regression specification error test for omitted variables.

Covariates were removed manually from the model in a stepwise fashion, starting with the covariate with the highest p-value in the full model. The resultant reduced model run, parameters tested, and the next covariate to be removed (with the highest p-value in this new model) was identified. This procedure was repeated until all covariates remaining in the model were less than  $p=0.05$ . Interactions were not returned to the model. The model specification was checked as above.

Once the simplified model was specified, regression diagnostics were performed to verify that the assumptions of regression modelling had been satisfied (that is, to check the linearity of the relationships, the constancy of the error variance and normality and independence of the error terms). Outliers were identified as those observations where the Studentized residual was greater than +2 or less than -2. Influential cases were identified where Cook's distance was greater than 4 divided by the number of observations in the regression model. The normality of the residuals were explored using kernel density plots, standardised normal probability (P-P) plots and quantiles of the covariate vs. quantiles of the normal distribution plots. The latter two plots were

used to determine whether there were deviations in normality of the residuals in the middle range of the data and the tail ends of the data, respectively. The homogeneity of variance of the residuals were explored using residual versus fitted plots, and White's test. Issues of multicollinearity were explored using the variance inflation factor, where variance inflation factor greater than 10 warranted further investigation. Finally, the relationship between the response variable and the covariates of interest were examined using scatterplots and augmented component plus residual plots, with lowess curves.

## Model Validation

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Model validation was beyond the scope of this project. However, there are several methods that would have been useful for performing model validation [23]. Firstly, we could have repeated the DRIVE study by collecting all the covariates included in the model; or obtained an existing dataset that contained this information. This would have allowed us to examine whether the regression model developed is still applicable for the new data, such as by calculating the mean squared prediction error, and comparing this to the error mean square. If the predictive model is good, these two values should be similar [23, 24]. There are difficulties with this methodology, however, because replication of observational studies can be difficult – especially in this case, replication would be required to be conducted in a similar jurisdiction, which has the same road rules and graduated licensing program. A second methodology that may have been considered would be to split the DRIVE dataset, and used the first set as the *model building* set, and the second set as the *validation set* – effectively simulating a replication of the study. The DRIVE dataset is potentially large enough for this methodology to be employed. The drawback of this methodology is that the variances of the estimated regression coefficients will be larger in the model building, due to the smaller numbers in the dataset. Other methods include performing bootstrap sampling and estimation or jackknife estimation.

## Software

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All analyses were performed using Intercooled Stata 9.2 for Windows (StatCorp LP, College Station, Texas, USA). Conversion between SAS and STATA datasets were performed using StatTransfer 9 (Circle Systems, Seattle, WA, USA).

# Risk Perception

## Results - Risk Perception

### Descriptive Statistics and Univariate Analysis

The descriptive statistics and results of the univariate analysis for each potential covariate are shown in Table 4.

**Table 4: Descriptive Statistics and Results of Univariate Regression for Risk Perception**

Covariate of Interest	n	Risk Perception Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
<i>Demographics</i>			
Age			
17	1453	7.98 (3.89)	p<0.001
18-19	1118	7.61 (3.93)	
20+	397	6.60 (3.80)	
Sex			
Female	1723	6.91 (3.58)	p<0.001
Male	1245	8.68 (4.12)	
Marital Status			
Single	2758	7.69 (3.91)	p=0.039
Married / Partnered	128	7.54 (3.92)	
Separated / Divorced	73	6.67 (3.86)	
Live with Parents			
No	227	6.60 (3.57)	p<0.001
Yes	2734	7.74 (3.93)	
Occupation			
High School Student	1513	8.17 (3.89)	p<0.001
TAFE / University	934	7.39 (3.91)	
Employed Full Time	251	6.96 (3.98)	
Employed Part Time	161	6.58 (3.43)	
Seeking Work / Receiving Benefits	62	5.40 (3.35)	
Not Working and Not Seeking Work	30	6.07 (3.17)	

Covariate of Interest	n	Risk Perception Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
Indigenous			
No	2925	7.65 (3.91)	p=0.998
Yes	31	7.65 (4.21)	
<b><i>Driving History</i></b>			
No. Times Driven Before	2958	3.15 (24.7)	p=0.445
Age at First Driving	785	11.52 (3.62)	p=0.778
Have had licence previously?			p=0.510
Never	874	8.18 (4.09)	
Learner's permit	16	8.19 (2.81)	
Provisional permit	23	8.39 (4.76)	
Full licence	7	7.00 (3.74)	
Expired licence	12	7.42 (4.62)	
Professional lessons			p=0.766
No	529	7.61 (3.86)	
Yes	2425	7.67 (3.92)	
Unprofessional lessons			p=0.475
No	137	7.42 (4.42)	
Yes	2820	7.67 (3.89)	
Practical Driver training			p=0.031
No	2821	7.63 (3.88)	
Yes	103	8.48 (4.60)	
Car modifications			p<0.001
No	262	7.84 (3.84)	
Yes	2462	8.87 (4.28)	
Don't Know	102	6.89 (3.71)	
<b><i>Physical / Mental Health</i></b>			
AUDIT score			p<0.001
Low	1735	7.11 (3.85)	
High	1233	8.42 (3.87)	
Kessler Score			p<0.001
Low	820	7.20 (3.78)	
Moderate	1191	7.72 (3.90)	
High	757	7.97 (3.95)	
Very High	200	7.92 (4.28)	

Covariate of Interest	n	Risk Perception Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
<b><i>Risky Driving Behaviour</i></b>			
Licensing rating			
Much better	491	8.43 (4.34)	p<0.001
Better	1346	7.54 (3.97)	
About the same	1076	7.45 (3.62)	
Worse	51	7.47 (3.11)	
Much Worse	3	8.67 (4.51)	
General rating			
Much better	173	9.09 (4.65)	p<0.001
Better	654	8.02 (4.30)	
About the same	1683	7.45 (3.72)	
Worse	431	7.43 (3.59)	
Much Worse	25	6.00 (3.12)	
<b><i>Alcohol / Drug Use</i></b>			
Alcohol Use in Previous 4-weeks			
Never	2795	7.55 (3.88)	p<0.001
Once or twice	153	9.41 (4.00)	
3 or more times	12	11.17 (4.76)	
Don't know	3	8.00 (1.00)	
Marijuana Use in Previous 4-weeks			
Never	2885	7.60 (3.90)	p<0.001
Once or twice	48	10.00 (3.64)	
3 or more times	23	10.13 (3.86)	
Don't know	5	10.40 (7.30)	
<b><i>Road Exposure (Pre- and Post-Licensing)</i></b>			
Car crash prior to baseline			
No	2140	7.63 (3.85)	p=0.595
Yes	825	7.71 (4.06)	
Car crash between baseline and resurvey			
No	2327	7.54 (3.86)	p=0.002
Yes	636	8.08 (4.07)	
<b><i>Risk Perception, Risky Driving Behaviour and Sensation Seeking</i></b>			
Baseline Risk Perception Score	2942	7.75 (4.32)	p<0.001
Baseline Risky driving behaviour Score	2954	12.04 (7.30)	p<0.001
Baseline Sensation Seeking Score	2968	6.76 (4.13)	p<0.001

There was a significant difference between baseline and resurvey scores for Risk Perception (7.8 [95% CI 7.6 to 7.9] vs. 7.7 [95% CI 7.35 to 7.8],  $p < 0.0001$  paired t-test).

Based upon the univariate modelling, the following covariates were considered in the initial multiple linear regression model: age at baseline; sex; marital status; living with parents; occupation; practical driver training; car modified; AUDIT score; Kessler score; licensing rating; general rating; alcohol use in past 4 weeks; marijuana use in past 4-weeks; crash between baseline and resurvey; baseline risky driving behaviour score; baseline risk perception score; and baseline sensation seeking score.

## Regression Modelling

The full model was run, and the resultant p-values are reported in Table 5.

**Table 5: Risk Perception full model p-values**

Covariate	P-Value
Sex	<0.001
Occupation	<0.001
Baseline risky driving behaviour score	<0.001
Baseline Risk Perception score	<0.001
AUDIT score	0.007
Marital status	0.044
Living with parents	0.087
Baseline Sensation Seeking score	0.213
Practical driver training	0.230
General rating	0.318
Licensing rating	0.423
Kessler score	0.461
Marijuana use in past 4-weeks	0.569
Alcohol use in past 4-weeks	0.572
Crash between baseline and resurvey	0.676
Car modification	0.902
Age at baseline	0.917

This model appeared to be misspecified, as it failed the specification link test ( $p < 0.001$ ), and there appeared to be omitted variables (that is, a Ramsey

regression specification error test for omitted variables rejected the null hypothesis with  $p < 0.001$ ).

Covariates were removed manually in a stepwise fashion, starting with the covariate with the highest p-value in the full model, as described in the methods section, in an attempt to improve the model specification. The resultant model included 5 covariates: sex, occupation, AUDIT score, baseline risky driving behaviour score and baseline risk perception score. There were 2915 observations in this model, and it accounted for approximately 32% of the variability in the risky driving behaviour score at resurvey (Table 6).

**Table 6: Fitted model for Risk Perception**

Covariate	Coefficient (95% confidence interval)	Standard Error	t	P> t
Sex	0.86 (0.61to1.10)	0.12	6.90	<0.001
Occupation (reference high school)				†
TAFE / University	-0.39 (-0.65to-0.12)	0.14	-2.83	0.005
Full time work	-1.13 (-1.56to-0.69)	0.22	-5.07	<0.001
Part time work	-0.96 (-1.49to-0.43)	0.27	-3.53	<0.001
Seeking work / on benefits	-2.09 (-2.91to-1.27)	0.42	-4.98	<0.001
Not working or on benefits	-2.06 (-3.25to-0.87)	0.61	-3.39	0.001
AUDIT score	0.44 (0.19 to 0.69)	0.13	3.46	0.001
Risky driving behaviour score at baseline	0.09 (0.07 to0.11)	0.01	9.23	<0.001
Risk perception score at baseline	0.35 (0.32 to0.39)	0.02	21.84	<0.001
Constant	3.59 (3.28 to 3.89)	0.15	23.28	<0.001

†  $p < 0.001$  overall for this covariate

That is, the model is:

$$\hat{Y} = 0.86X_1 - 0.39X_{2A} - 1.13X_{2B} - 0.96X_{2C} - 2.09X_{2D} - 2.06X_{2E} + 0.44X_3 + 0.09X_4 + 0.35X_5 + 3.59$$

where:

$\hat{Y}$ =Expected Risk Perception Score at resurvey

$X_1$ =Sex (0=female; 1=male)

$X_{2A}$ =Occupation: Tafe or university (0=no; 1=yes)

$X_{2B}$ =Occupation: Full time work (0=no; 1=yes)

$X_{2C}$ =Occupation: Part time work (0=no; 1=yes)

$X_{2D}$ =Occupation: Seeking work or receiving benefits (0=no; 1=yes)

$X_{2E}$ =Occupation: Not seeking work or receiving benefits (0=no; 1=yes)

$X_3$ =AUDIT (0=low; 1=high)

$X_4$ =Risk Taking Score at baseline

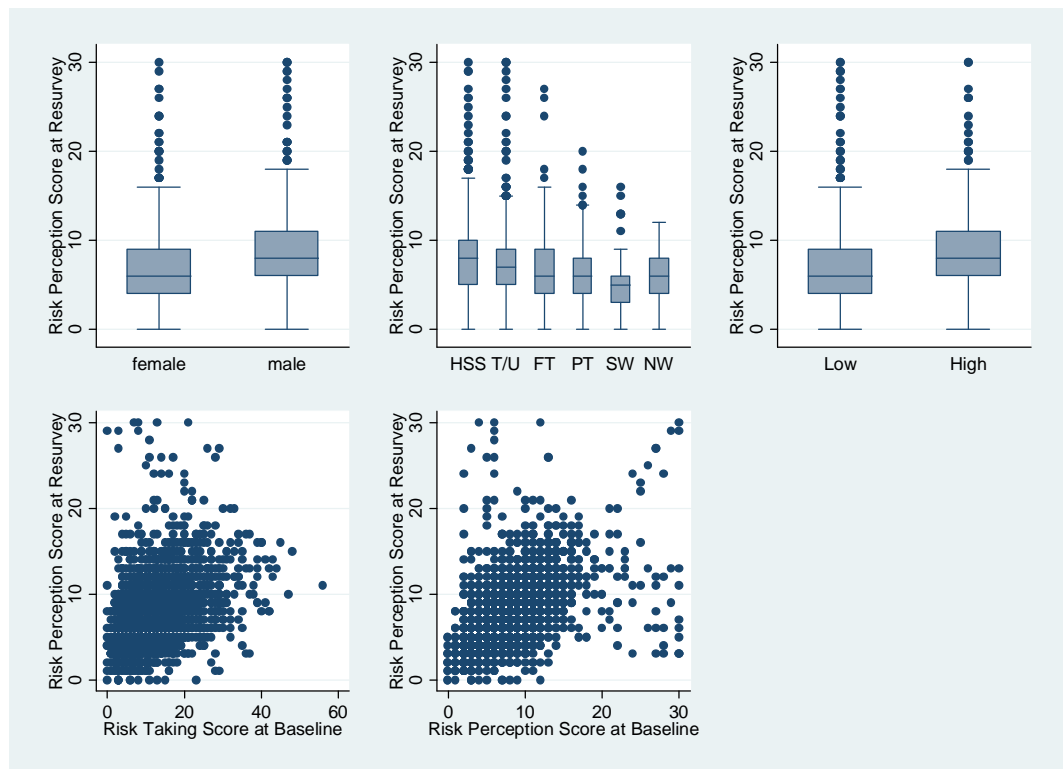
$X_5$ =Risk Perception Score at baseline

Unfortunately, this model appears to be misspecified, failing both the specification link test ( $p < 0.001$ ) and the Ramsey regression specification error test for omitted variables ( $p < 0.001$ ).

## Regression Diagnostics

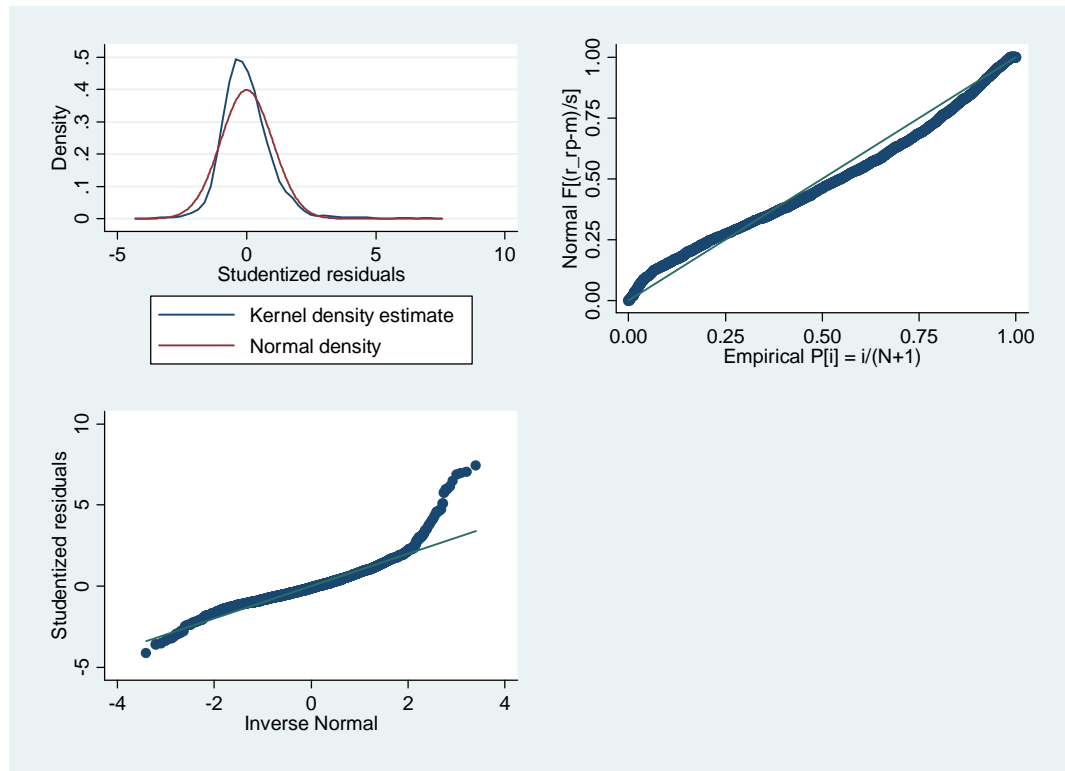
There were 117 (4%) observations identified as outliers (Studentized residual  $> |2|$ , Figure 1), and 86 (3% of all observations) of these outlying observations were considered influential on the model (Cook's Distance  $> 1.36 \times 10^{-3}$ ).

**Figure 1: Risk Perception Score at Resurvey by covariate included in the model. HSS=high school student; T/U=tafe or university student; FT = employed full time; PT=employed part time; SW=seeking work; NW=not working. Low and High refer to AUDIT scores.**



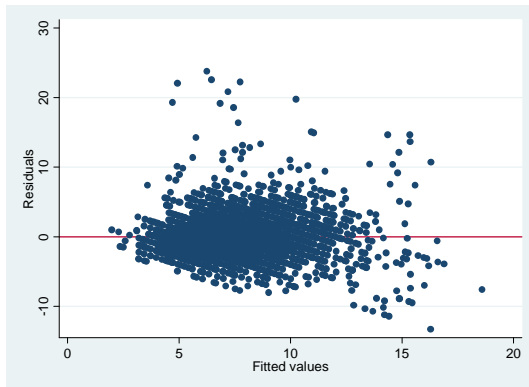
The model failed the assumption that the residuals were normally distributed (Figure 2, Shapiro-Wilk test  $p < 0.00001$ ). The quantiles of residuals versus the quantiles of the normal distribution plot shows quite heavy tails, especially for higher residual values. Transformation of the X and Y variables (i.e. the covariates and the risky driving behaviour score at resurvey) did nothing to improve this departure from normality.

Figure 2: Plots of kernel density (top left), standardized normal probability (top right) and quantiles of residuals versus quantiles of normal distribution (bottom left) for the Risk Perception model



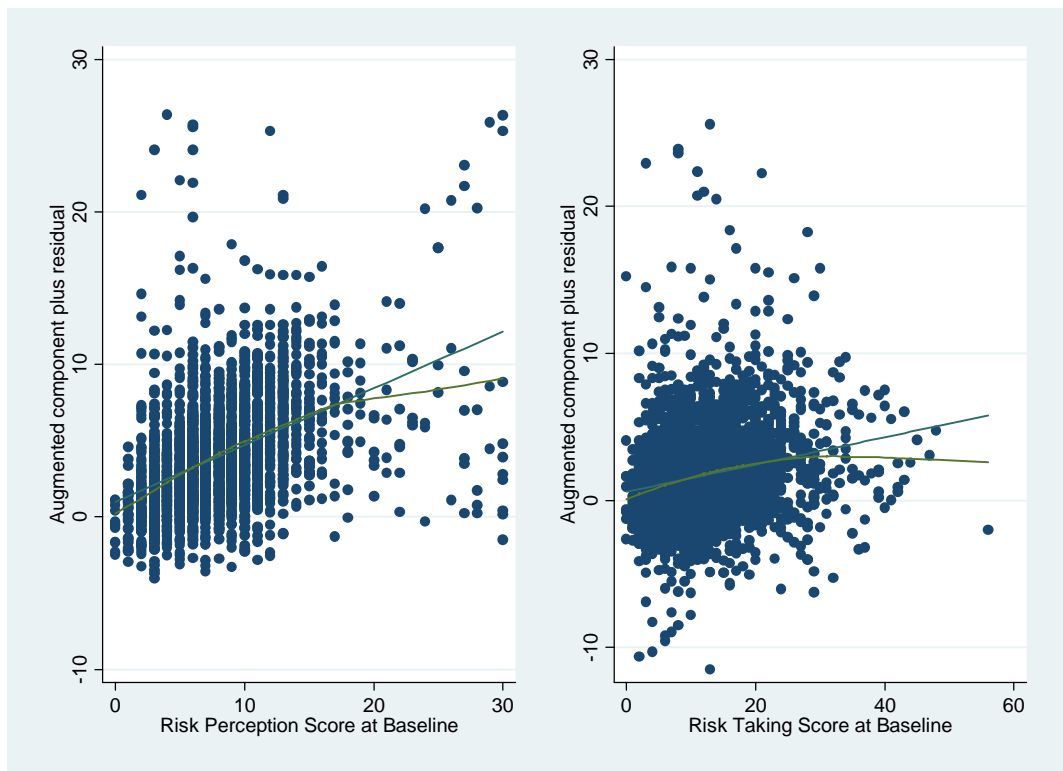
The residual variance was not homogenous (Figure 3, White's test  $p < 0.0001$ ). However, White's test is sensitive to the assumption of normality, and graphically, there does not seem to be any major deviation from homogeneity in the residuals.

Figure 3: Residuals versus fitted values for the Risk Perception model



There was no issue with multicollinearity, with the values of the variance inflation factors all less than 1.5. For the continuous covariates, augmented component plus residual plots do not show any major deviations from linearity, except at the higher scores where data is sparser (Figure 4).

Figure 4: Augmented component-plus residual plots for risk perception score at baseline and risky driving behaviour score at baseline



## Discussion – Risk Perception

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While this model is far from perfect, it does give some insight into changes in risk perception. The model accounts for only 32% of the variability in the Risk Perception score at resurvey.

The model described above suggests that when all other covariates are held fixed significantly poorer road safety perceptions were found in males compared to females; those in high school compared to any other occupation or the unemployed; and high versus low alcohol users. Those reporting a high level of risky driving behaviours or poorer risk perceptions at baseline also had significantly poorer road safety perceptions.

Gender has been reported to be an important factor in predicting risk perception in previous models [25-29]. However, the reasons for males having higher resurvey risk perception scores (lower risk perception) compared to females are unclear. Self-regulatory behaviour is reportedly associated with risk perception [30], and perhaps therefore self-regulatory competence in males is slower to mature.

To my knowledge there have been no other reports indicating that there is a relationship between change in risk perception and occupation. The relationship reported here is likely to be due to changes in maturity, and in particular changes in self-regulatory behaviour [30] as a function of peer group – it is postulated that those in high school are likely to exhibit less self-regulatory behaviour and therefore developed poorer perceptions of road safety risks compared to those in the workforce, those unemployed or outside of the school system. Another possibility is that the participants in high school at the time of the baseline survey have moved on to further education, employment or unemployment, and it may be the *change* in this status, and the associated change in freedom which is associated with the development of poorer risk perceptions. Unfortunately, the effects of change in occupational status could not be investigated directly because the occupation at the time of resurvey was not collected in the resurvey questionnaire (Appendix 2).

Risky levels of alcohol use are associated with increased risk perception scores at resurvey in my model – that is, participants' perceived risks as less of a

problem. The literature reports an interaction between sex and alcohol use – with a reported greater proportion of females consuming alcohol, but their attitudes towards drink driving are more socially acceptable [31]. The effect of interaction between sex and alcohol use was not explored in my model. Others have suggested that risky behaviours often co-occur – for example alcohol use, marijuana use and other drug use [32]. We know that these behaviours increase the risk of a negative outcome, however, the actual risk on any given occasion is still very low [33]. Thus, although risky driving increases the risk, it is possible that a person might drive under the influence of alcohol many times, yet never have a negative consequence, such as a crash. Therefore, over time, if participants were exposed to risks but without the negative outcome they may have inflated their perception that the risky driving behaviour was in fact safer than it really was.

Others have reported that adolescents with lower risk perceptions exhibit higher risk taking behaviour [34], which has obvious implications on injury. Thus the ability to improve risk perception potentially could reduce risky driving behaviours in young adults.

There are a number of strengths in the design of the DRIVE study. Firstly, its sheer size (20,822 participants) makes it one of the largest cohort studies of risk factors for injuries in young drivers [12]. The modelling conducted here was based upon over 2,900 observations. Additionally, there is a wide variability in risk perception reported at baseline [12].

There are a various methodological issues and limitations in this study. Firstly, the model may have reduced external validity because there is the potential for respondent bias (only 15.9% of eligible drivers completed the baseline survey). A random sample (n=4984) of these were requested to complete the resurvey – with 60% (n=2970) participating. The modelling presented here is based upon the questionnaires from the DRIVE survey which were designed to address a different purpose (to establish risk factors for driver injury [12]). Therefore, not all covariates that could be potentially useful at identifying predictors for *change* in risk perception were included. Thus the conclusions drawn from the modelling presented here are limited because this model appears to miss important covariates, and it accounts for only 32% of the

variability in the Risk Perception Score at resurvey. There are a number of potential covariates that might be important in the model that have been previously identified in the literature. Other covariates which may be important are: music video and news viewing [26], and cultural factors [35, 36]. Another issue is where the number of observations within a categorical covariate are not balanced across that covariate – this may adversely affect the estimates obtained (they may be biased with a larger variance).

The model specification may have been improved if a robust multivariate approach (e.g. least absolute residual, iteratively reweighted least squares or least median squares regression) had been used as a remedy for outlying observations [23]. Using such an approach would have dampened the effect of the outlying cases, may have provided a better fit for the majority of the observations, reduced the need for transformation of variables – and potentially indicated that additional covariates were not required.

## Conclusion – Risk Perception

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While the model above is far from perfect, it does give some insight into predictors of change in risk perception score at resurvey. The model above suggests that male high school students with high risk drinking are likely to have the highest risk perception scores at resurvey. Therefore, if an education campaign around reducing risk perception scores were mounted, these males would be the best targets for that campaign.

# Risky Driving Behaviour

## Results – Risky driving behaviour

### Descriptive Statistics and Univariate Analysis

The descriptive statistics and results of the univariate analysis for each potential covariate are shown in Table 7.

Table 7: Descriptive Statistics and Results of Univariate Regression for Risky driving behaviour

Covariate of Interest	n	Risky driving behaviour Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
<i>Demographics</i>			
Age			
17	1453	13.60 (6.62)	p<0.001
18-19	1119	12.43 (6.51)	
20+	397	10.40 (6.53)	
Sex			
Female	1724	11.57 (5.84)	p<0.001
Male	1245	14.34 (7.08)	
Marital Status			
Single	2760	12.75 (6.47)	p=0.217
Married / Partnered	127	13.09 (7.84)	
Separated / Divorced	73	11.33 (6.10)	
Live with Parents			
No	227	10.73 (5.73)	p<0.001
Yes	2735	12.89 (6.57)	
Occupation			
High School Student	1510	13.47 (6.48)	p<0.001
TAFE / University	937	11.59 (6.30)	
Employed Full Time	250	13.27 (7.52)	
Employed Part Time	162	12.02 (5.87)	
Seeking Work / Receiving Benefits	63	10.46 (6.15)	
Not Working and Not Seeking Work	30	13..33 (5.94)	

Covariate of Interest	n	Risky driving behaviour Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
Indigenous			
No	2926	12.72 (6.53)	p=0.201
Yes	31	14.23 (6.58)	
<b><i>Driving History</i></b>			
No. Times Driven Before	2960	3.16 (24.71)	p=0.103
Age at First Driving	788	11.50 (3.62)	p=0.044
Have had licence previously?			p=0.212
Never	876	13.88 (6.80)	
Learner's permit	17	18.53 (5.84)	
Provisional permit	23	16.17 (8.65)	
Full licence	7	12.71 (6.18)	
Expired licence	12	14.25 (7.76)	
Professional lessons			p=0.158
No	528	12.37 (6.53)	
Yes	2427	12.81 (6.53)	
Unprofessional lessons			p=0.296
No	136	12.16 (7.70)	
Yes	2822	12.76 (6.47)	
Practical Driver training			p=0.204
No	2820	12.72 (6.54)	
Yes	104	13.55 (6.24)	
Car modifications			p<0.001
No	262	16.35 (8.01)	
Yes	2461	12.48 (6.24)	
Don't Know	103	12.78 (6.52)	
<b><i>Physical / Mental Health</i></b>			
AUDIT score			p<0.001
Low	1736	11.53 (6.28)	
High	1233	14.41 (6.51)	
Kessler Score			p<0.001
Low	820	11.52 (6.45)	
Moderate	1193	12.88 (6.46)	
High	756	13.41 (6.20)	
Very High	200	14.23 (7.73)	

Covariate of Interest	n	Risky driving behaviour Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
<b><i>Risky Driving Behaviour</i></b>			
Licensing rating			
Much better	488	14.19 (7.53)	p<0.001
Better	1347	12.63 (6.50)	
About the same	1079	12.26 (5.91)	
Worse	52	10.69 (6.47)	
Much Worse	3	22.00 (18.08)	
General rating			
Much better	173	14.73 ((7.74)	p<0.001
Better	655	13.74 (7.18)	
About the same	1684	12.47 (6.14)	
Worse	43	11.53 (6.01)	
Much Worse	25	10.48 (7.77)	
<b><i>Alcohol / Drug Use</i></b>			
Alcohol Use in Previous 4-weeks			
Never	2795	12.51 (6.43)	p<0.001
Once or twice	154	16.22 (6.89)	
3 or more times	12	20.08 (8.77)	
Don't know	3	18.00 (10.82)	
Marijuana Use in Previous 4-weeks			
Never	2887	12.63 (6.51)	p<0.001
Once or twice	47	16.28 ( 6.73)	
3 or more times	23	16.30 ( 5.29)	
Don't know	5	21.2 ( 9.91)	
<b><i>Road Exposure (Pre- and Post-Licensing)</i></b>			
Car crash prior to baseline			
No	2141	12.44 ( 6.42)	p<0.001
Yes	825	13.45 ( 6.75)	
Car crash between baseline and resurvey			
No	2326	12.35 ( 6.36)	p<0.001
Yes	638	14.11 ( 6.97)	
<b><i>Risk Perception, Risky Driving Behaviour and Sensation Seeking</i></b>			
Baseline Risk Perception Score	2943	7.76 ( 4.32)	p<0.001
Baseline Risky Driving Behaviour Score	2955	12.05 ( 7.29)	p<0.001
Baseline Sensation Seeking Score	2969	6.76 ( 4.13)	p<0.001

There was no significant difference between baseline and resurvey scores for risky driving behaviour (12.0 [95% CI 11.8 to 12.3] vs. 12.7 [95% CI 12.5 to 13.0],  $p=0.19$  paired t-test).

Based upon the univariate modelling, the following covariates were considered in the initial multiple linear regression model: age at baseline; sex; marital status; living with parents; occupation; number of times driven before; age at first driving; professional lessons; car modified; AUDIT score; Kessler score; licensing rating; general rating; alcohol use in past 4 weeks; marijuana use in past 4-weeks; crash prior to baseline; crash between baseline and resurvey; baseline risky driving behaviour score; baseline risk perception score; and baseline sensation seeking score.

The full model was run, and the resultant p-values are reported in Table 8.

**Table 8: Risky driving behaviour full model p-values**

Covariate	P-Value
Baseline risky driving behaviour score	0.000
Sex	0.005
Marijuana use in past 4-weeks	0.022
Marital Status	0.034
Baseline risk perception score	0.150
Living with parents	0.202
Baseline sensation seeking score	0.219
First driven age	0.264
Alcohol use in past 4-weeks	0.271
Kessler score	0.281
No. times driven before	0.298
Age at baseline	0.428
Licensing rating	0.438
Occupation	0.539
Crash between baseline and resurvey	0.560
Professional lessons	0.614
Car modified	0.665
AUDIT score	0.693
Crash prior to baseline	0.698
General rating	0.810

This model appeared to be misspecified (link test  $p < 0.009$ ; Ramsey specification test  $p = 0.0013$ ).

Covariates were removed manually in a stepwise fashion, starting with the covariate with the highest p-value in the full model, as described in the methods section, in an attempt to improve the model specification. The resultant model included 4 covariates: sex, marital status, living with parents and baseline risky driving behaviour score. There were 2940 observations in this model, and it accounted for approximately 43% of the variability in the risky driving behaviour score at resurvey (Table 9).

Table 9: Fitted model for Risky driving behaviour.

Covariate	Coefficient (95% confidence interval)	Standard Error	t	P>  t
Sex	1.30 (0.93-1.67)	0.19	6.87	<0.001
Marital status (Reference: Single)				†
Married / Partnered	1.22 (0.31-2.13)	0.46	2.62	0.009
Separated / Divorced / Widowed	-0.94 (-2.10-0.22)	0.59	-1.58	0.114
Live with parents	1.06 (0.36-1.76)	0.36	2.97	0.003
Risky driving behaviour score at baseline	0.56 (0.53-0.58)	0.01	43.76	<0.001
Constant	4.44 (3.72-5.17)	0.37	11.99	<0.001

† p=0.008 overall for this covariate

That is, the model is:

$$\hat{Y} = 1.30X_1 + 1.22X_{2A} - 0.94X_{2B} + 1.06X_3 + 0.56X_4 + 4.44$$

where:

$\hat{Y}$ =Expected Risk Taking Score at resurvey

$X_1$ =Sex (0=female; 1=male)

$X_{2A}$ =Marital Status: Married or partnered (0=no; 1=yes)

$X_{2B}$ =Marital status: Separated, divorced or widowed (0=no; 1=yes)

$X_3$ =Live with parents (0=no; 1=yes)

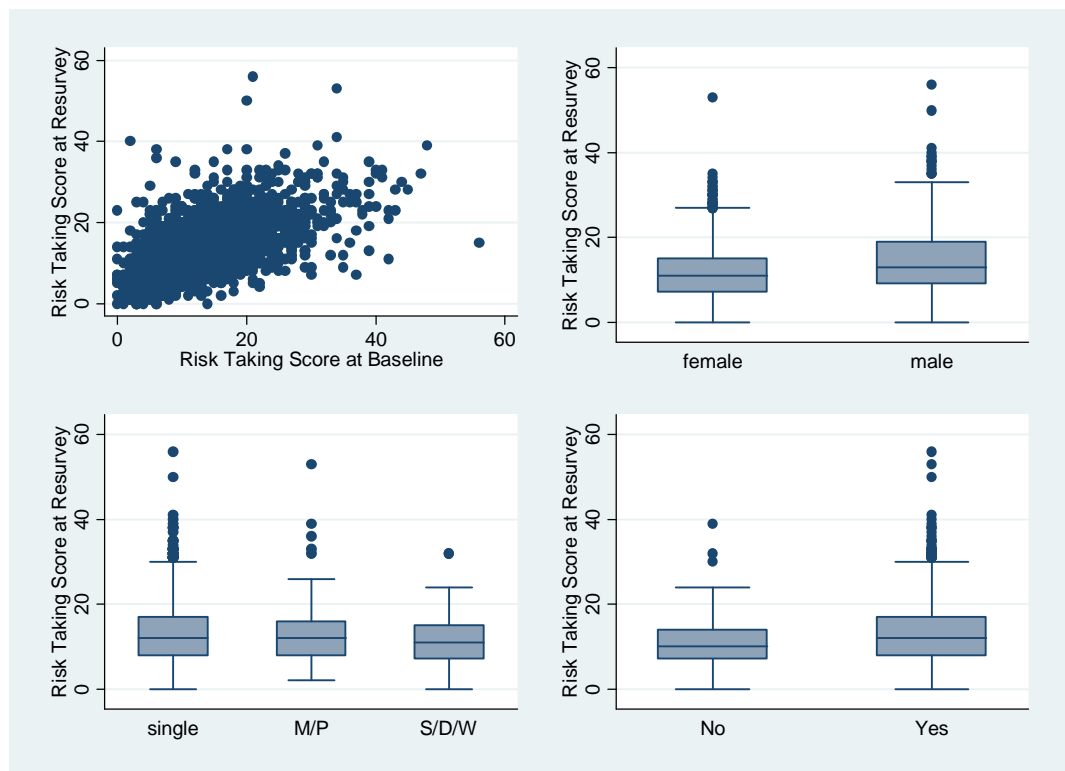
$X_4$ =Risk Taking Score at baseline

Unfortunately, this model all appears to suffer from misspecification, failing both the specification link test (p=0.016) and the Ramsey regression specification error test for omitted variables (p=0.007).

## Regression Diagnostics

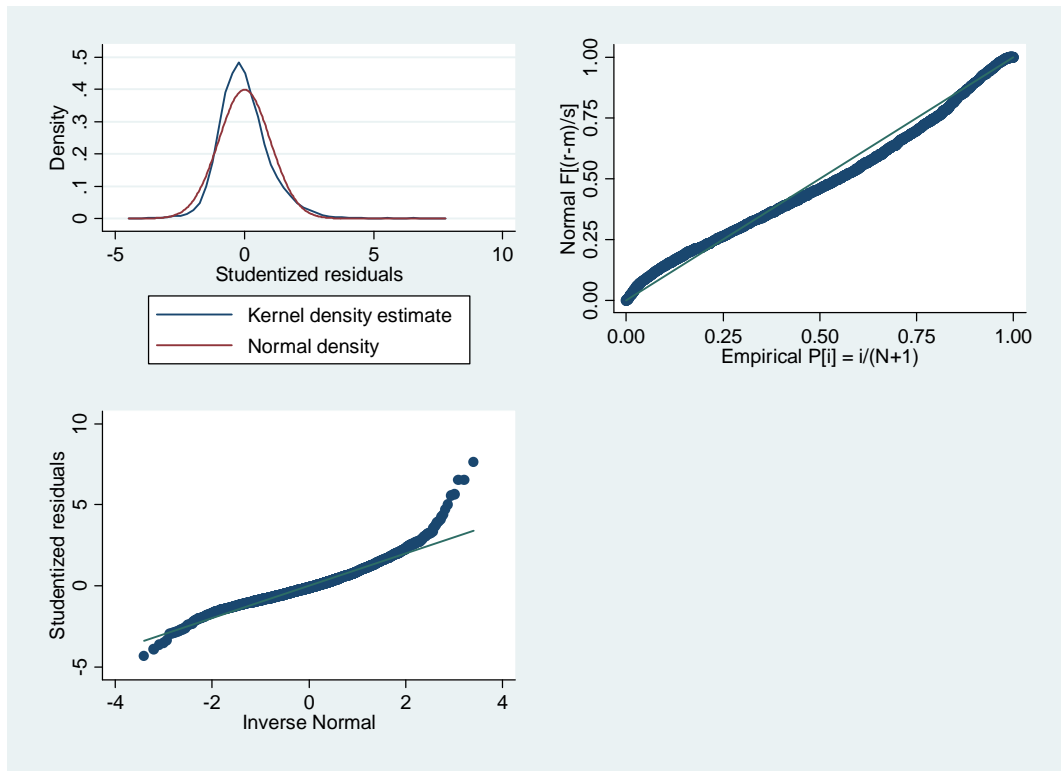
There were 141 (5%) observations identified as outliers (Studentized residual  $> |2|$  Figure 5), and 63 (2% of dataset) of these outlying observations were considered influential on the model (Cook's Distance  $> 1.36 \times 10^{-3}$ ).

**Figure 5: Risky driving behaviour Score at Resurvey by covariate included in the model. M/P = married or partnered; S/D/W=separated, divorced or widowed.**



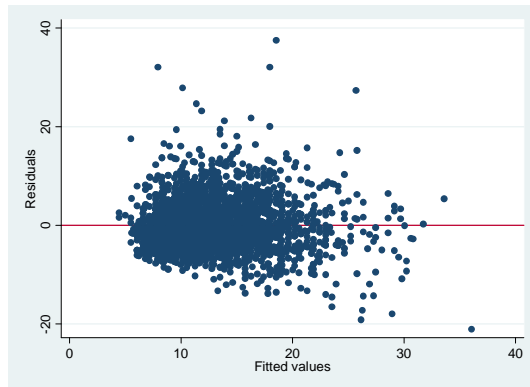
The model failed the assumption that the residuals were normally distributed (Figure 6, Shapiro-Wilk  $p < 0.00001$ ). As in the Risk Perception model, the quantiles of residuals versus the quantiles of the normal distribution plot shows quite heavy tails and transformation of the X and Y variables (i.e. the covariates and the risky driving behaviour score at resurvey) did nothing to improve this departure from normality.

Figure 6: Plots of kernel density (top left), standardized normal probability (top right) and quantiles of residuals versus quantiles of normal distribution (bottom left) for the Risky driving behaviour model



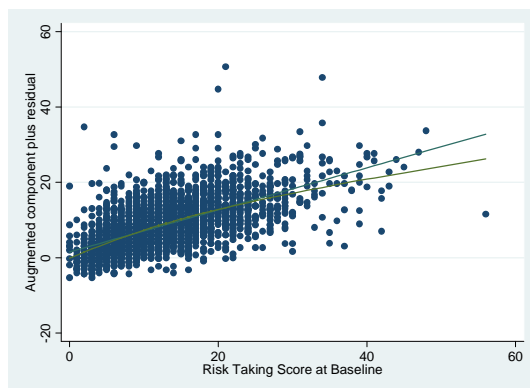
The model also appears to have heterogeneous variance, with increasing residual value with increasing fitted value (Figure 7, White's test  $p < 0.0001$ ), however this deviation does not appear to be major.

Figure 7: Residuals versus fitted values for the Risky driving behaviour model



There was no issue with multicollinearity, with the values of the variance inflation factors all less than 1.1. No major deviations from linearity in the continuous covariates were identified (Figure 8).

Figure 8: Augmented component-plus residual plots for risky driving behaviour score at baseline and risk perception score at baseline



## Discussion – Risky Driving Behaviour

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As with the Risk Perception model, the Risky Driving Behaviour model is not perfect – it accounts for only 43% of the variability in the change in risky driving behaviour score at resurvey, and fails several of the assumptions around multiple regression modelling. However, it does still provide some useful insights into what can change risky driving behaviour.

The model described above suggests increases in risky driving behaviour were found for males compared to females; married or partnered participants compared to single participants; those that live with their parents compared to

those who don't. Additionally, those with higher baseline risky driving behaviours at baseline, also have higher resurvey risky driving behaviours.

A number of studies have examined the effect of risky driving behaviour on injury following a motor vehicle accident. These have been comprehensively reviewed by Turner and colleagues in their systematic review [37] which reported the following predictors for crash are: alcohol use; not wearing a seatbelt; driving without a licence; having a crash in the past year; being male; prior offence for speeding, drunk driving or other offence; taking risks while driving. Thus it is clear that risky driving behaviour is associated with injury – however, to date, there is no evidence of whether changing risky driving behaviour can lead to changes in injury rates [37]. That said it would be logical to assume that reductions in risky driving behaviour would result in reductions in injury rates.

In my model, sex was an important predictor of changes in risky driving behaviour score at resurvey, with males likely to exhibit greater risky driving behaviours than females, which confirms previous reports of this association [38]. However, the reason why risky driving behaviour increases more in males at resurvey compared to females is unclear. It is possible that with increasing driving experience, males are more willing to participate in risky driving behaviour than females.

It was surprising to note that married or those living with their partner had greater risky driving behaviours at resurvey compared to the single participants. This is in contrast with the widely held belief that those who marry are more responsible, and take less risks [39], and with evidence reporting that those who have never married are more likely to suffer driver injury than married people [40]. Alternatively, this may reflect changes in partner status between baseline and resurvey: those single at baseline may be partnered at resurvey – with associated improvements in risky driving behaviour; while those partnered at baseline may have become single by resurvey with associated increase in risky driving behaviours. Unfortunately, the effects of change in marital status could not be investigated directly because the marital status at the time of resurvey was not collected in the resurvey questionnaire (Appendix 2).

Those living with their parents had greater risky driving behaviours at resurvey compared with those not living with their parents. Again the reason for this is unclear. It may be that those living away from home are more “responsible” (especially when considering 17-24 year olds) and therefore less likely to engage in risky driving behaviour. This finding is in contrast to evidence that parental consequences of risk-taking behaviour can modulate risk-taking in young people [41] – especially if parental supervision is high [42], and the parent imposes restrictions on the young driver [43]. An alternative, purely speculative explanation is that the living circumstances of the participants changed between baseline and resurvey – those living at home with their parents may well have moved away, and with the associated freedoms that this encompasses, this may have reflected as changes in risky driving behaviour. As above, the effects of change in whom the participant lived with (e.g. from parents to others) could not be investigated directly because this information was not collected in the resurvey questionnaire (Appendix 2).

Some of the strengths and limitations of the modelling have been described in the Risk Perception modelling section, and will not be repeated here. These limitations included the external validity of the modelling; the lack of potentially important covariates because the survey was constructed with a different aim; and the potential for a biased estimator with large variance due to unbalance in the categorical covariates. Limitations specific to this model include that the conclusions drawn from the modelling presented here are limited because this model appears to miss important covariates, and it accounts for only 43% of the variability in the Risky driving behaviour Score at resurvey. There are a number of potential covariates that might be important in the model that have been previously identified in the literature. Other covariates which may be important are: video gaming [44]; endorsement of traditional views [45]; aggression [45, 46]; alienation from the rest of society [45]; psychosocial functioning [47]. The model may have also been strengthened by the inclusion of interaction terms, such as that between sex and substance abuse.

As with the previous model the model specification may have been improved if a robust multivariate approach had been used as a remedy for outlying observations [23].

## Conclusions – Risky driving behaviour

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With these caveats in mind, and given the limited availability of public funds to alter attitudes to risky driving behaviour, it would appear that efforts to reduce risky driving behaviour should be directed towards male drivers, those who live at home with their parents, and married or partnered people. Further modelling is required to determine whether within-participant changes (such as changes in living arrangements and marital status) are important in determining changes in risky driving behaviour.

# Sensation Seeking

## Results – Sensation Seeking

### Descriptive Statistics and Univariate Analysis

The descriptive statistics and results of the univariate analysis for each potential covariate are shown in Table 10.

**Table 10: Descriptive Statistics and Results of Univariate Regression for Sensation Seeking**

Covariate of Interest	n	Sensation Seeking Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
<i>Demographics</i>			
Age			
17	1452	6.58 (4.09)	p<0.001
18-19	1113	6.10 (4.04)	
20+	398	5.03 (4.06)	
Sex			
Female	1721	5.54 (3.90)	p<0.001
Male	1242	7.09 (4.11)	
Marital Status			
Single	2753	6.23 (4.05)	p=0.368
Married / Partnered	129	5.30 (3.88)	
Separated / Divorced	72	6.50 (4.61)	
Live with Parents			
No	227	5.53 (3.94)	p=0.011
Yes	2729	6.25 (4.07)	
Occupation			
High School Student	1509	6.55 (4.07)	p=0.012
TAFE / University	935	5.72 (3.91)	
Employed Full Time	249	5.99 (4.26)	
Employed Part Time	161	5.66 (4.12)	
Seeking Work / Receiving Benefits	62	6.29 (4.20)	
Not Working and Not Seeking Work	30	7.50 (3.99)	

Covariate of Interest	n	Sensation Seeking Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
Indigenous			
No	2920	6.18 (4.06)	p=0.131
Yes	31	7.29 (4.15)	
<b><i>Driving History</i></b>			
No. Times Driven Before	2953	3.15 (24.73)	p=0.238
Age at First Driving	787	11.49 (3.62)	p=0.215
Have had licence previously?			p=0.863
Never	875	6.98 (4.24)	
Learner's permit	17	8.47 (3.97)	
Provisional permit	22	6.36 (4.15)	
Full licence	7	5.29 (2.36)	
Expired licence	12	14.25 (7.76)	
Professional lessons			p=0.257
No	528	6.02 (4.01)	
Yes	2421	6.24 (4.08)	
Unprofessional lessons			p=0.464
No	137	6.44 (4.14)	
Yes	2815	6.18 (4.06)	
Practical Driver training			p=0.014
No	2814	6.16 (4.05)	
Yes	104	7.16 (4.17)	
Car modifications			p<0.001
No	261	7.21 (4.17)	
Yes	2459	6.04 (4.02)	
Don't Know	101	5.92 (3.86)	
<b><i>Physical / Mental Health</i></b>			
AUDIT score			p<0.001
Low	1736	5.34 (3.75)	
High	1227	7.39 (4.18)	
Kessler Score			p<0.001
Low	820	5.28 (3.78)	
Moderate	1191	6.26 (4.00)	
High	754	6.85 (4.20)	
Very High	198	7.07 (4.35)	

Covariate of Interest	n	Sensation Seeking Score at Resurvey [Mean (SD)]	p-value in univariate linear regression analysis
<b><i>Risky Driving Behaviour</i></b>			
Licensing rating			
Much better	487	6.33 [3.94]	p=0.605
Better	1347	6.05 (4.10)	
About the same	1074	6.28 (4.04)	
Worse	51	6.53 (4.46)	
Much Worse	3	9.33 (7.37)	
General rating			
Much better	173	6.45 (4.14)	p=0.757
Better	653	6.21 (3.97)	
About the same	1679	6.13 (4.09)	
Worse	431	6.32 (4.11)	
Much Worse	25	5.96 (4.13)	
<b><i>Alcohol / Drug Use</i></b>			
Alcohol Use in Previous 4-weeks			
Never	2791	6.07 (4.05)	p<0.001
Once or twice	152	8.02 (3.72)	
3 or more times	12	11.5 (3.37)	
Don't know	3	8.00 (6.08)	
Marijuana Use in Previous 4-weeks			
Never	2881	6.12 (4.04)	p<0.001
Once or twice	48	8.69 (4.04)	
3 or more times	22	9.41 (5.01)	
Don't know	5	8.20 (4.32)	
<b><i>Road Exposure (Pre- and Post-Licensing)</i></b>			
Car crash prior to baseline			
No	2136	6.01 (3.95)	p<0.001
Yes	824	6.67 (4.32)	
Car crash between baseline and resurvey			
No	2320	6.06 (3.99)	p=0.001
Yes	638	6.67 (4.29)	
<b><i>Risk Perception, Risky Driving Behaviour and Sensation Seeking</i></b>			
Baseline Risk Perception Score	2937	7.75 (4.30)	p<0.001
Baseline Risky Driving Behaviour Score	2949	12.04 (7.28)	p<0.001
Baseline Sensation Seeking Score	2963	6.75 (4.12)	p<0.001

There was a significant difference between baseline and resurvey scores for Sensation Seeking (6.7 [95% CI 6.6 to 6.9] vs. 6.2 [95% CI 6.0 to 6.3],  $p < 0.0001$  paired t-test).

Based upon the univariate modelling, the following covariates were considered in the initial multiple linear regression model: age at baseline; sex; living with parents; occupation; being Indigenous; practical driver training; car modified; AUDIT score; Kessler score; alcohol use in past 4 weeks; marijuana use in past 4-weeks; crash prior to baseline; crash between baseline and resurvey; baseline risky driving behaviour score; baseline risk perception score; and baseline sensation seeking score.

## Regression Modelling

The full model was run, and the resultant p-values are reported in Table 11.

**Table 11: Sensation Seeking full model p-values**

Covariate	P-Value
Sex	<0.001
Baseline Sensation Seeking score	<0.001
Baseline Risky driving behaviour score	0.064
AUDIT score	0.093
Occupation	0.291
Practical driver training	0.295
Living with parents	0.455
Baseline Risk Perception score	0.540
Car crash between baseline and resurvey	0.568
Car crash prior to baseline	0.597
Car modifications	0.704
Alcohol use in past 4-weeks	0.761
Kessler score	0.815
Age at baseline	0.855
Indigenous	0.913
Marijuana use in past 4-weeks	0.978

This model appears to be appropriately specified (specification link test  $p = 0.260$ ), with no omitted variables (Ramsey regression specification error test for omitted variables  $p = 0.286$ ).

Covariates were removed manually in a stepwise fashion, starting with the covariate with the highest p-value in the full model, as described in the methods section, in an attempt to improve the model specification. The resultant model included 4 covariates: sex, baseline sensation seeking score, AUDIT score and occupation. There were 2946 observations in this model, and it accounted for approximately 47% of the variability in the sensation seeking score at resurvey (Table 12).

**Table 12: Fitted model for Sensation Seeking**

Covariate	Coefficient (95% confidence interval)	Standard Error	t	P> t
Sex	0.66 (0.44-0.88)	0.11	5.90	<0.001
Occupation (reference high school)				†
TAFE / University	-0.27 (-0.51to-0.02)	0.12	-2.16	0.031
Full time work	-0.48 (-0.88to-0.09)	0.20	-2.39	0.017
Part time work	-0.50 (-0.98to-0.02)	0.25	-2.03	0.042
Seeking work / on benefits	-0.41 (-1.16to-0.34)	0.38	-1.08	0.282
Not working or on benefits	-0.42 (-0.65to-1.48)	0.54	0.76	0.445
AUDIT score	0.34 (0.11-0.57)	0.12	2.88	0.004
Sensation seeking score at baseline	0.64 (0.61-0.67)	0.01	45.54	<0.001
Constant	1.60 (1.35-1.84)	0.13	12.57	<0.001

† p=0.033 overall for this covariate

That is, the model is:

$$\hat{Y} = 0.66X_1 - 0.27X_{2A} - 0.48X_{2B} - 0.50X_{2C} - 0.41X_{2D} - 0.42X_{2E} + 0.34X_3 + 0.64X_4 + 1.60$$

where:

$\hat{Y}$ =Risk Perception Score at resurvey

$X_1$ =Sex (0=female; 1=male)

$X_{2A}$ =Occupation: Tafe or university (0=no; 1=yes)

$X_{2B}$ =Occupation: Full time work (0=no; 1=yes)

$X_{2C}$ =Occupation: Part time work (0=no; 1=yes)

$X_{2D}$ =Occupation: Seeking work or receiving benefits (0=no; 1=yes)

$X_{2E}$ =Occupation: Not seeking work or receiving benefits (0=no; 1=yes)

$X_3$ =AUDIT (0=low; 1=high)

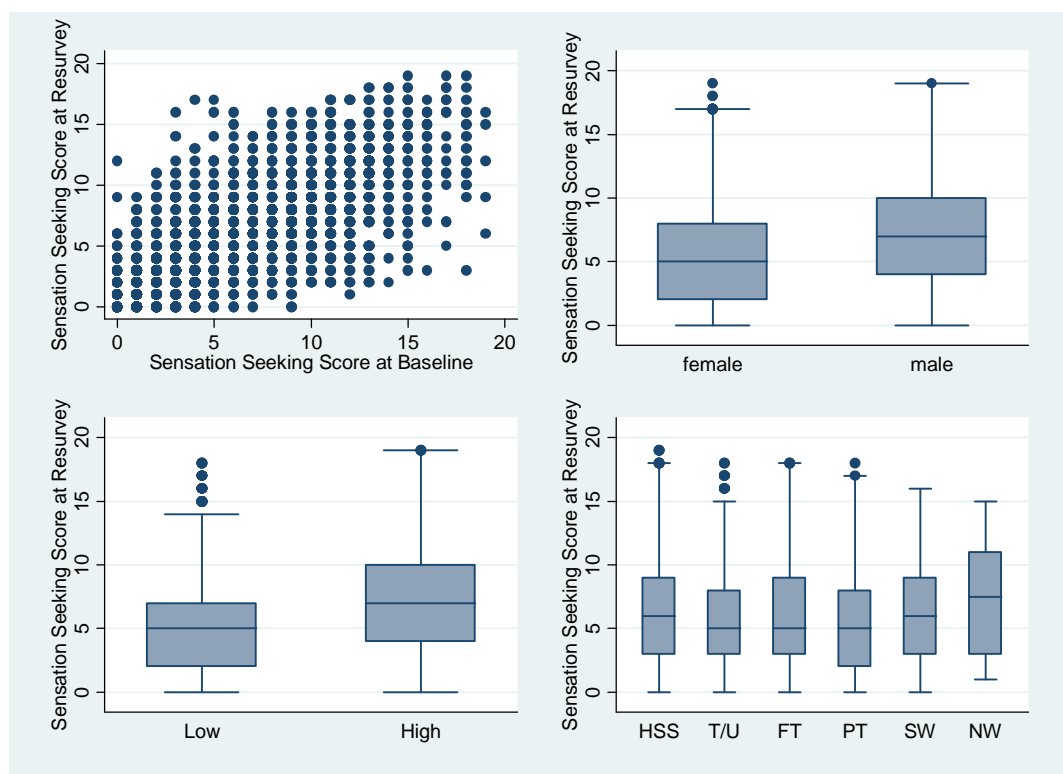
$X_4$ =Sensation Seeking Score at baseline

This model appears to be appropriately specified (specification link test  $p=0.320$ ), with no omitted variables (Ramsey regression specification error test for omitted variables  $p=0.380$ ).

## Regression Diagnostics

The number of outliers in this model appears to be less than in those previously described (114 (4%) with Studentized residual  $> |2|$ ; Figure 9), and 66 (2% of dataset) of these outlying observations were considered influential on the model (Cook's Distance  $> 1.36 \times 10^{-3}$ ).

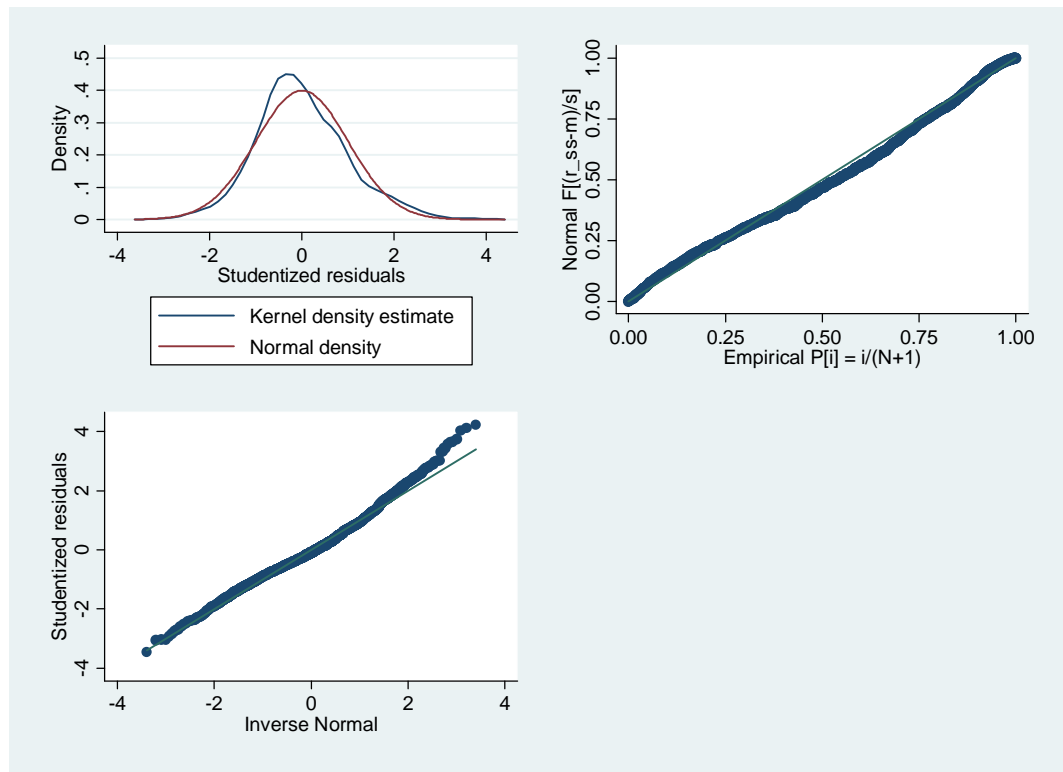
**Figure 9: Sensation Seeking Score at Resurvey by covariate included in the model. HSS=high school student; T/U=tafe or university student; FT = employed full time; PT=employed part time; SW=seeking work; NW=not working. Low and High refer to AUDIT scores.**



A kernel density plot, standardized normal probability plot and the quantiles of residuals versus the quantiles of the normal distribution plot all show deviations from "normality" (Figure 10). This is confirmed by a Shapiro-Wilk W test for normality ( $p<0.00001$ ). However, only the quantiles of residuals versus

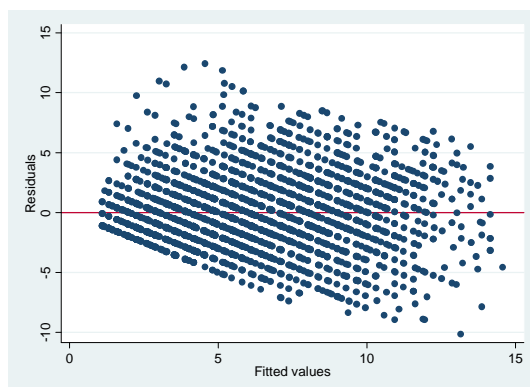
the quantiles of the normal distribution plot shows a heavy tail in the upper end, and the other plots do not show any major deviations.

**Figure 10: Plots of kernel density (top left), standardized normal probability (top right) and quantiles of residuals versus quantiles of normal distribution (bottom left) for the Sensation Seeking model**



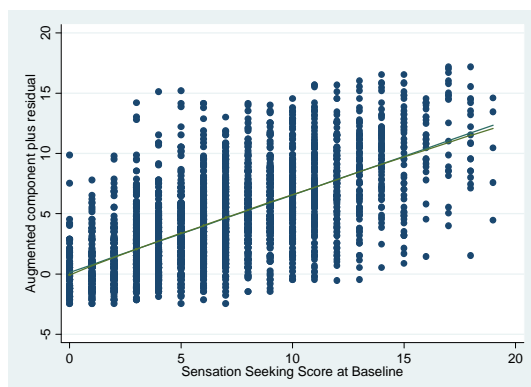
The homoscedasticity of the residuals were examined graphically using a residual versus fitted plot (Figure 11). A White's test suggests that the variance is not homogenous ( $P < 0.0001$ ), and the value of the residual appears to decrease with increasing sensation seeking score.

**Figure 11: Residuals versus fitted values for the Sensation Seeking model**



There were no issues with collinearity in this model (variance inflation factors were all less than 1.2). For the continuous covariate, augmented component plus residual plots shows an excellent linear relationship between baseline sensation seeking score and sensation seeking score at resurvey (Figure 12).

**Figure 12: Augmented component-plus residual plots for sensation seeking score at baseline**



Overall, this model only showed minor violations in model assumptions, perhaps with the exception of the homogeneity of residuals.

## Discussion – Sensation Seeking

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Of the three models fitted, the change in Sensation Seeking model appears to have the best fit, accounting for 47% in the variability in Sensation Seeking score at resurvey. The model described above suggests greater increases in sensation seeking behaviours are observed in males compared to females; those in high school compared to any other occupation or unemployment; and those high versus low alcohol users. Additionally, those with higher sensation seeking behaviours at baseline also have higher sensation seeking behaviours at resurvey.

A number of others have studied the effect of sensation seeking behaviour on driving (for example see the review by Jonah [11]). Jonah reports that sensation seeking is moderately related to risky driving [11].

In my model, sex was an important predictor for change in sensation seeking score at resurvey, with men having higher scores at resurvey than women, confirming earlier reports that males score more highly in sensation seeking scales [31]. Interestingly, others have reported a stronger association

between sensation seeking and the number of traffic violations in women compared to men [48]. However, the reasons why males report a greater increase in sensation seeking behaviours is unclear – perhaps it reflects a slower maturation?

Occupation was also an important predictor. As with the Risk Perception model, the reductions in sensation seeking behaviour at resurvey by those *not* in high schools may have more to do with peer-to-peer interactions, and social responsibility, rather than “occupation” *per se*. It also may reflect changes in status from high school to paid employment, higher education or unemployment, as discussed in the risk perception model.

Excessive alcohol consumption in young people could be considered a sensation seeking behaviour, so it is unsurprising that those with high risk drinking observed in my model have significantly higher sensation seeking behaviours at resurvey compared to their low-risk counterparts. There is some evidence in the literature of an interaction between alcohol consumption and sensation seeking with high sensation seekers taking greater risks when they believed they had consumed alcohol while low sensation seekers became more cautious [49]. It is interesting to observe that those with high alcohol use at baseline have increased sensation seeking behaviours at resurvey. Does this reflect an attitudinal difference, such that if the sensation seeking behaviour is not associated with any negative consequence that those behaviours will continue, perhaps to an even greater extent? This is especially interesting considering sensation seeking is supposed to be a trait, and therefore reasonably stable. Further research in this area is warranted.

Unfortunately, as Jonah [11] suggests, those with high sensation seeking behaviours are unlikely to be influenced by educational, or enforcement measures, which makes reducing the risk of injury difficult.

Some of the strengths and limitations of the modelling have been described in the Risk Perception modelling section, and will not be repeated here. These limitations included the external validity of the modelling; the lack of potentially important covariates because the survey was constructed with a different aim; and the potential for a biased estimator with large variance due to unbalance in the categorical covariates. While model diagnostics suggested that I did not

fail to identify any important covariates, it is possible that the proportion of variance in Sensation Seeking at resurvey could be improved by the addition of some other covariates. One possibility is whether risk taking is occasional or frequent [50].

As with the previous model the model specification may have been improved if a robust multivariate approach had been used as a remedy for outlying observations [23].

## **Conclusion – Sensation Seeking**

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Sensation seeking behaviour is associated with drink driving [51], aggressive and risky driving [52, 53]. Thus a public health campaign to reduce sensation seeking behaviour should, in theory, also reduce risky driving in young people. Given the results of this model, this public health campaign should be targeted towards male high-school students with high risk drinking patterns. Additional models should be developed to determine whether within-participant changes, such as changes in employment / educational status and drinking patterns are important determinants for changes in sensation seeking behaviour.

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# General Discussion

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It is of note that all three of the models included sex as a predictor. Whether changes in risk perception, risky driving behaviour and sensation seeking are a function of sex *per se* (that is some biological function of a person's sex) or because of gender stereotyping remains controversial. Given that males have increased scores in all three models, it is possible that this may reflect a slower maturation in males compared to females [54].

The relationship between alcohol consumption and risky driving is more intuitive – high levels of alcohol consumption could be seen as a form of sensation seeking, so it is of interest that this factor is included in both the sensation seeking and risky driving behaviour models. Furthermore, in the absence of negative consequences, risky driving behaviours and sensation seeking may increase over time.

The role of occupation is less clear, and to my knowledge hasn't been explored in the current literature around risk perception, risky driving behaviour and sensation seeking. However, occupation is an important predictor for risk perception and sensation seeking models. Exactly why is unclear, however, it may be related to age – participants in high school are likely to be younger than those in employment, unemployed or in higher education. Perhaps therefore, occupation is a surrogate marker for age, or even maturity – which is discussed further below. Potentially participant's "occupation" changed between baseline and resurvey – those in high school may have joined the workforce, been undertaking further study or been unemployed. The associated changes in freedom may have influenced the increases in risk perception and risky driving behaviour in these individuals. There are probably complex interactions that have not been explored in my models, which may improve their specificity.

While the three models produced have suggested factors that may be important in determining changes in risk perception, risky driving behaviour or

sensation seeking behaviour at resurvey, it is very difficult to postulate why changes in these behaviours occur over time. For example, why do risky driving behaviour scores and sensation seeking scores both increase between baseline and resurvey ( $p < 0.001$ , paired t-test), while risk perception does not change? It is possible that the observed changes in scores might be due to the relatively short period between the initial survey and the resurvey (approximately 2 years). To date there is no published data to indicate what changes in score are meaningful. Further research is required in this regard.

Very few reports of what changes risky driving behaviour appear in the literature [30]. However, identifying these factors could be very useful in developing appropriate strategies to deal with the consequences of risky driving behaviour behaviours. There have been some suggestions that adolescents require more novelty and higher levels of stimulation in their lives and therefore engage in greater risk taking, possibly accounted for by changes in the limbic system of the brain at this time [30]. Secondly, and as mentioned previously, there are changes in self-regulatory behaviour e.g. having the ability to resist peer pressure, around this time [30]. However, this would suggest that sensation seeking, risk perception and risky driving behaviour would decrease as a function of time, not increase as has been seen in the models presented above. This apparent disparity is difficult to explain. Are we failing to educate our young drivers of the risks associated with dangerous driving behaviours?

Clearly risk perception and sensation seeking behaviour are inextricably linked with risky driving behaviour. What is also evident is that far too many of our young people are dying on our roads. We need to educate and utilise law enforcement to reduce this tragedy. Hopefully the identification of predictors for risk perceptions, risky driving behaviours and sensation seeking behaviours will assist in targeting these programs towards those at highest risk of injury on our roads.

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# Appendices

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## Appendix 1 – Further detail on abandoned ANCOVA approach

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ANCOVA modelling is somewhat similar to the linear regression approach successfully employed in this study. Originally it was planned to use an ANCOVA approach to build an explanatory model which would explain changes in risk taking, risky driving behaviour and sensation seeking between baseline and follow-up survey. For this approach, the appropriate score was treated categorically (low, medium and high). The ANCOVA method is best used when data are *balanced* across the levels of the factors of interest, that is, where equal numbers of observations are available for each of the three scores.

Model building was planned to be conducted in a similar manner to the predictive approach, however, we planned to build an explanatory model where to provide an estimate of score at resurvey adjusted for the possible confounding effects of other covariates. However, the steps for building this model are slightly different. Firstly, the covariates to include in the model should be fixed, and scaling/transformation needed to be dealt with *a priori*. This differs from the predictive model building that was successfully applied where the choice of covariates were more flexible – the aim of predictive modelling is to produce a reliable prediction – rather than to make inferences about which variables are truly explanatory.

The ANCOVA modelling was abandoned because the data were not balanced, and the model had poor fit.

## Appendix 2 – DRIVE baseline survey & DRIVE resurvey

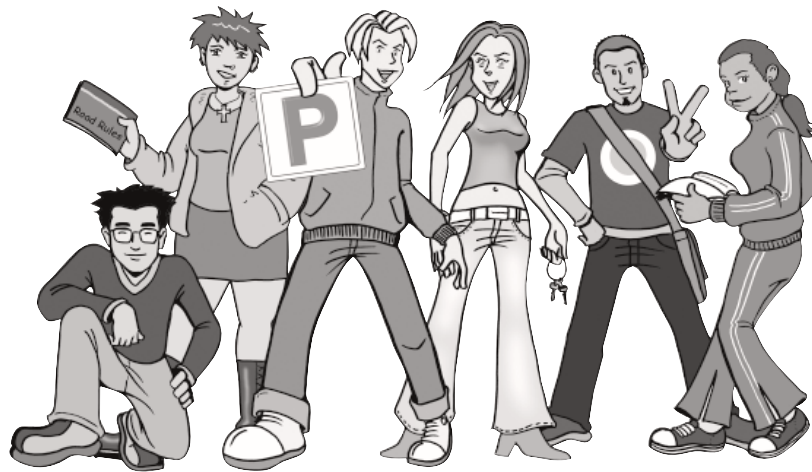
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Copies of these documents are included behind this page.



**Institute for International Health  
University of Sydney**

144 Burren Street Newtown Sydney NSW 2042



# ***DRIVE***

**This booklet contains:**

- Instructions
- Consent forms
- Questionnaire

## **DRIVE: INSTRUCTIONS**

- 1. Please read the Information sheet and sign *both* copies of the Consent form before filling in the questionnaire**
- 3. Please answer *every* question in all 4 sections of the Questionnaire**
- 4. When you have finished, please place this booklet, and one signed copy of the Consent form, in the reply-paid envelope and post it in an Australia Post mailbox.**

**Do you want to find out more about the study, or ask someone how to fill in the questionnaire? If so,**

please call                      Rebecca Ivers: (02) 9351 0042  
    Stephanie Blows: (02) 9351 0126  
    Toll-free: 1800 01 33 01

or email                              [drive@iih.usyd.edu.au](mailto:drive@iih.usyd.edu.au)

The Human Ethics Committee of The University of Sydney has given approval for the conduct of this project. Any person with concerns or complaints about the conduct of a research study can contact the Manager of Ethics and Biosafety Administration, University of Sydney, on (02) 9351 4811.

**Thank you for giving up your time to help make the roads safer!**



**Institute for International Health**

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**info@iih.usyd.edu.au** · www.iih.org  
ABN 90 085 953 331

**Please sign this consent form and return it to us with the booklet**

I, (first name) \_\_\_\_\_ (surname or family name) \_\_\_\_\_

*Please write your name exactly as it appears on your Driver's Licence*

have read the Information Sheet and understand the aims and procedures of the study, and what my rights are as a study participant. I am also satisfied with the answers to any queries about the study.

I acknowledge that I have the right to withdraw from the study at any time without any penalty or effect on my driver's licence.

I understand that I am consenting to the research team of the Drive Study being given future access to:

- My traffic accident database details held by the NSW Roads & Traffic Authority (RTA)
- My licensing details and driving offence records held by the RTA,
- Information held by the NSW Health Department in routinely collected health databases about injuries I sustain in motor vehicle crashes.

I understand that the information collected will not be released in an identified form to a third party without my written consent, except in the unlikely event that the research team is forced by the court to produce such information without reference to me for legal actions that the court deems to be appropriate.

I agree that the results of the study may be published, providing that I can't be identified.

I acknowledge that the research project will be carried out according to the guidelines on *Ethical Conduct in Research Involving Humans* by the National Health & Medical Research Council.

I hereby freely agree to participate in the Drive Study.

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_

**Driver's Licence Number:**



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ABN 90 085 953 331

**Please sign this consent form and tear out and keep**

**I, (first name)** \_\_\_\_\_ **(surname or family name)** \_\_\_\_\_

*Please write your name exactly as it appears on your Driver's Licence*

have read the Information Sheet and understand the aims and procedures of the study, and what my rights are as a study participant. I am also satisfied with the answers to any queries about the study.

I acknowledge that I have the right to withdraw from the study at any time without any penalty or effect on my driver's licence.

I understand that I am consenting to the research team of the Drive Study being given future access to:

- My traffic accident database details held by the NSW Roads & Traffic Authority (RTA)
- My licensing details and driving offence records held by the RTA,
- Information held by the NSW Health Department in routinely collected health databases about injuries I sustain in motor vehicle crashes.

I understand that the information collected will not be released in an identified form to a third party without my written consent, except in the unlikely event that the research team is forced by the court to produce such information without reference to me for legal actions that the court deems to be appropriate.

I agree that the results of the study may be published, providing that I can't be identified.

I acknowledge that the research project will be carried out according to the guidelines on *Ethical Conduct in Research Involving Humans* by the National Health & Medical Research Council.

I hereby freely agree to participate in the Drive Study.

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_

**Driver's Licence Number:**

Study ID Number ..... (office use only)

## SECTION A

### Your Contact Details

**WE WON'T TELL ANYONE YOUR DETAILS!**

The research team needs these details to check your crash and injury records, and to contact you for the next part of the study. All your information will be kept strictly confidential and will not be passed on to anyone. The RTA and Police have no access to any of the information we collect about you.

**A1. Your name:**

A1.1 First or given name

A1.2 Surname or family name

**A2. Your date of birth:**  /  /   
day month year

**A3. Your driver's licence number:**          
Write your licence number exactly as it appears on your licence.  
*Please do NOT write the 'card number'.*

**A4. The expiry date for your driver's licence:**  
 /  /   
day month year

A4.1 The card number on your driver's licence:   
*(this is a 10 digit number in the top right hand corner of your licence)*

**A5. Your address:**

A5.1 Street number and name

A5.2 Suburb

A5.3 Town/City

A5.4 Postcode

# DRIVE: QUESTIONNAIRE



## A6. Your postal address (if different from above):

A6.1

A6.2

A6.3 Postcode

## A7. Your phone number:

A7.1 Your home telephone number ()   
Area code

A7.2 Your work telephone number ()   
Area code

A7.3 Mobile telephone number

## A8.1 Your email address:

@

***Please give us the name and phone number of a close friend or relative who is unlikely to change their address in the next year. If we lose contact with you in the next year we will ask them how we can contact you. We will not tell this person any of your details. Please tell this person about the study, and that they may be contacted in the future for this purpose.***

## A9. Contact person:

A9.1 First or given name

A9.2 Surname or family name

A9.3 Relationship to you  
(e.g. parent, friend)

A9.4 Telephone number ()   
Area code



# DRIVE: QUESTIONNAIRE

**B9.** In which country were you, your mother and your father born?

Please tick one box for each

	You	Mother	Father
Australia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
China	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New Zealand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
England	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Viet Nam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Italy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lebanon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Greece	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Philippines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hong Kong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Germany	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
India	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**B10.** If you were NOT born in Australia, in what year did you first arrive in Australia to live here for one year or more?  
(e.g. 1970)



## SECTION C

### Driving Experience

**C1.** How many times did you drive a car (or van/utility/4WD etc) on the road without the necessary licence before you received your learner licence (L-plates)?

If you aren't sure, please give an approximate answer – don't leave blank.

If none, please write '0'

**C2.** When you had your learner licence, how many times did you drive a car (or van/utility/4WD etc) on the road without a supervising driver in the car?

If you aren't sure, please give an approximate answer – don't leave blank.

If none, please write '0'

The next questions are about all motorised vehicles. This includes cars, trucks, motorcycles, tractors, go-karts, and any other motorised vehicles.

**C3.** About how many times had you driven a motorised vehicle before getting your L-plates?

If you aren't sure, please give an approximate answer – don't leave blank.

If none, please write '0' and go to question C5.

**C4.** Which type of motorised vehicle had you driven MOST before getting your L-plates?

Tick one box only

- Motorcycle/trail bike
- Car/van/utility/4WD
- Tractor/farm vehicle
- Go-kart
- Other

Please specify \_\_\_\_\_

# DRIVE: QUESTIONNAIRE



**C5.** About how many times have you driven or raced a go-kart, rally or race car, or trail bike?

*If you aren't sure, please give an approximate answer – don't leave blank*

\_\_\_\_ times

**C6.** Have you ever driven a motorcycle, moped or motorscooter?

Yes

No  → Go to question C9

**C7.** How old were you when you first drove a motorcycle, moped or motor scooter?

\_\_\_\_ years old

**C8.** Do you have a motorcycle licence?

No, never had a licence

Yes, learner licence

Yes, provisional licence

Yes, full licence

No, licence has expired

## Driving Instruction

The following questions are about lessons you had that were supervised by a professional driving instructor.

**C9.** When you were learning to drive, did you have any driving lessons with a professional driving instructor or school?

Yes

No  → Go to question C13

**C10.** About how many HOURS IN TOTAL of professional driving lessons did you have?

*If you aren't sure, please give an approximate answer – don't leave blank*

\_\_\_\_ hours in total

**C11.** During these lessons, about how often did you drive on the following types of roads?

	Very Often	Often	Some-times	Hardly Ever	Never
Residential or side streets (speed limit 60 km/h or less)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Major roads (70-80 km/h)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Open roads (90-110 km/h)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**C12.** About how many of your professional lessons took place in the following conditions?

*If you aren't sure, please give an approximate answer – don't leave blank*

*If none, please write '0'*

	Number of lessons
When it was <b>raining</b>	_____
When it was <b>dark</b>	_____
On <b>gravel</b> (unsealed) roads	_____
In <b>heavy traffic</b>	_____

### Non-professional driving instruction

The following questions are about driving practice sessions that were supervised by someone who was NOT a professional driving instructor. For example, a family member or friend might have supervised you.

This includes times you went out just for driving practice, as well as times you drove when you were going somewhere (e.g. to the shops or to school).

**C13.** Did anyone other than a professional driving instructor teach you how to drive or supervise your driving practice during the time you had your L-plates?

*For example, a family member or friend.*

Yes

No  → Go to question C22

# DRIVE: QUESTIONNAIRE

**C14.** About how many hours of these supervised driving practice sessions did you have?

*If you aren't sure, please give an approximate answer – don't leave blank*

\_\_\_\_ hours of practice

**C15.** About how often did you have these non-professional driving practice sessions during the time you had your L-plates?

More than 7 times a week

4-7 times a week

2-3 times a week

Once a week

About twice a month

About once a month

Less than once a month

**C16.** During these practice sessions, about how often did you drive on the following types of roads?

*Please tick one box on each line*

	Very Often	Often	Some-times	Hardly Ever	Never
--	------------	-------	------------	-------------	-------

Residential or side streets (speed limit 60 km/h or less)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Major roads (70-80 km/h)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Open roads (90-110 km/h)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

**C17.** About how many of these lessons took place in the following conditions?

*If you aren't sure, please give an approximate answer – don't leave blank*

*If none, please write '0'*

**Number of lessons**

When it was **raining** \_\_\_\_\_

When it was **dark** \_\_\_\_\_

On **gravel** (unsealed) roads \_\_\_\_\_

In **heavy traffic** \_\_\_\_\_

*The following questions are about the person that supervised **most** of your non-professional driving practice sessions.*

**C18.** Was this person:

Male

Female

**C19.** About how old was this person when they were teaching you to drive?

\_\_\_\_ years old

**C20.** Which one of the following best describes your relationship to this person?

*Tick one box only*

Parent

Brother or sister

Other family member

Friend

School teacher

Other

*Please specify* \_\_\_\_\_

**C21.** Over the past 12 months, how many penalties for traffic violations has this person received (not including parking fines)?

*If none, please write '0'*

\_\_\_\_ or Don't know



## Other Driver Training

**C22. Have you ever attended either of the following seminars?**

*Please tick the box next to each seminar you attended, and the year you attended.*

**'RRISK' seminar**   
 (Full-day seminar at Southern Cross University in Lismore or in the Tweed Heads Civic Centre about risks associated with drinking, drugs, driving and partying)

**If yes, in which year?**

Earlier than 2000   
 2000   
 2001   
 2002

**'U-turn the Wheel'**   
 (Young driver awareness programme)  
**If yes, in which year?**

Earlier than 2000   
 2000   
 2001   
 2002

**C23. Have you ever attended any practical driver training courses for car driving?**

*For example: advanced, defensive or low risk driver training.*

*This does NOT include professional lessons with a private driving instructor.*

Yes

No  → *Go to question C25*

**C24. If yes, where was the practical part of the course conducted?**

*Tick one box only*

At a closed venue (closed road or racetrack)   
 On public roads   
 Both at a closed venue and on public roads

## Driving experience after getting your P-plates

**C25. Do you have regular access to a car, van, truck or similar vehicle to drive?**

*Please tick the vehicle that you use most often*

*Tick one box only*

No  → *Go to question C27*

Yes, my own car

Yes, parent's or family car

Yes, other car (eg friend's)

**C26. Has the car you mostly drive been modified?**

*E.g. Suspension raised or lowered, wide tyres, non-standard additions or body kits such as side skirts, bumper additions, muffler.*

Yes

No

Don't know

**C27. During an average week, about how long (to the nearest hour) do you spend:**

*If none, please write '0'*

*If you aren't sure, please give an approximate answer – don't leave blank*

**DRIVING** a car, van, truck or similar vehicle?      hours

Travelling as a **PASSENGER** in a car, van, truck or similar vehicle?      hours

**DRIVING** a motorcycle?      hours



**SECTION D**

**Your lifestyle**

- D1. How often do you have a drink containing alcohol?**
- Never  → *Go to question D4*
  - Once a month or less
  - 2-4 times a month
  - 2-3 times a week
  - 4 times a week or more

*For the next 2 questions please refer to the following standard drink guide.*

**Each of these is equal to one standard drink:**

425 mL Light beer = 285 mL Regular beer = 100 mL Wine = 60 mL Fortified wine = 30 mL Spirits

- D2. How many drinks of alcohol would you have on a typical day when you are drinking?**
- 1 or 2
  - 3 or 4
  - 5 or 6
  - 7, 8 or 9
  - 10 or more

- D3. How often would you have six or more drinks on one occasion?**
- Never
  - Once a month or less
  - 2-4 times a month
  - 2-3 times a week
  - 4 times a week or more

- D4. About how often have you used marijuana (cannabis) in the last 12 months?**
- Never
  - Once a month or less
  - 2-4 times a month
  - 2-3 times a week
  - 4 times a week or more

- D5. About how often have you used other recreational drugs in the last 12 months?**
- Never
  - Once a month or less
  - 2-4 times a month
  - 2-3 times a week
  - 4 times a week or more



## Driving habits and opinions

The next questions are about your current driving habits and opinions

**D6.** When YOU are driving, how safe do you think the following are?

Please tick one box on each line

	Always safe	Mostly safe	Some-times safe	Rarely safe
Driving at 70 km/h in a 60 km/h speed zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving at 110 km/h in a 100 km/h speed zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving with a blood alcohol level just over the legal limit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving after smoking marijuana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving a poorly maintained car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Going through a red light	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving while talking on a mobile phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving with 2 or more passengers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving between midnight and 6am	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving while using SMS (text messaging) on a mobile phone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**D7.** How would you rate YOUR driving ability compared to other drivers at the same stage of licensing as yourself?

Much better

Better

About the same

Worse

Much worse

**D8.** How would you rate YOUR driving ability compared to other drivers in general?

Much better

Better

About the same

Worse

Much worse

**D9.** During the past 4 weeks, how often did you drive a car or other vehicle when you had been drinking alcohol?

Never	Once or twice	3 or more times	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**D10.** During the past 4 weeks, how often did you drive a car or other vehicle when you had been smoking marijuana?

Never	Once or twice	3 or more times	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

# DRIVE: QUESTIONNAIRE

## D11. How often do you:

Please tick one box on each line

	Very Often	Often	Some-times	Hardly Ever	Never
Drive fast just for the thrill of it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take some risks when driving because it makes driving more fun?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive at about 70km/h in a 60km/h speed zone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do burnouts, donuts, or skids just for the fun of it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speed up if someone is trying to pass you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Follow very close behind slower drivers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make rude gestures at other drivers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Honk your horn or flash your lights in anger at other drivers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Race or drag race for the fun of it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive without wearing a seatbelt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive while talking on a mobile phone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive while listening to loud music?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive with 2 or more passengers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive while using SMS (text messaging) on a mobile phone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## D12. Have you, or someone close to you, ever been involved in a car crash where someone was seriously injured or killed?

Yes

No

## D13. Please read each statement carefully and decide whether the statement on the whole DESCRIBES YOU (tick TRUE) or on the whole DOES NOT describe you (tick FALSE).

Please answer either True or False to every statement even if you are not entirely sure of your answer.

	TRUE	FALSE
I tend to begin a new job without much advance planning on how I will do it	<input type="checkbox"/>	<input type="checkbox"/>
I usually think about what I am going to do before I do it	<input type="checkbox"/>	<input type="checkbox"/>
I often do things on impulse	<input type="checkbox"/>	<input type="checkbox"/>
I very seldom spend much time on the details of planning ahead	<input type="checkbox"/>	<input type="checkbox"/>
I like to have new and exciting experiences and sensations even if they are a little frightening	<input type="checkbox"/>	<input type="checkbox"/>
Before I begin a complicated job, I make careful plans	<input type="checkbox"/>	<input type="checkbox"/>
I would like to take off on a trip with no pre-planned or definite routes or timetables	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy getting into new situations where you can't predict how things will turn out	<input type="checkbox"/>	<input type="checkbox"/>
I like doing things just for the thrill of it	<input type="checkbox"/>	<input type="checkbox"/>
I tend to change interests frequently	<input type="checkbox"/>	<input type="checkbox"/>
I sometimes like to do things that are a little frightening	<input type="checkbox"/>	<input type="checkbox"/>
I'll try anything once	<input type="checkbox"/>	<input type="checkbox"/>

# DRIVE: QUESTIONNAIRE

	TRUE	FALSE
I would like the kind of life where one is on the move and travelling a lot, with lots of change and excitement	<input type="checkbox"/>	<input type="checkbox"/>
I sometimes do 'crazy' things just for fun	<input type="checkbox"/>	<input type="checkbox"/>
I like to explore a strange city or section of town by myself, even if it means getting lost	<input type="checkbox"/>	<input type="checkbox"/>
I prefer friends who are excitingly unpredictable	<input type="checkbox"/>	<input type="checkbox"/>
I often get so carried away by new and exciting things that I never think of possible complications	<input type="checkbox"/>	<input type="checkbox"/>
I am an impulsive person	<input type="checkbox"/>	<input type="checkbox"/>
I like 'wild' uninhibited parties	<input type="checkbox"/>	<input type="checkbox"/>

## Your feelings

These questions are about **how you feel** and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

### D14. During the past 4 weeks....

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
How often did you feel tired out for no good reason?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel nervous?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel so nervous that nothing could calm you down?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel hopeless?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
How often did you feel restless or fidgety?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel so restless you could not sit still?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel depressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel that everything was an effort?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel so sad that nothing could cheer you up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel worthless?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### D15.

**In the past 12 months have you deliberately hurt yourself or done anything that you knew might have harmed you or even killed you?**

Yes

No

If yes, what was it that you did?

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If these questions have brought up any issues for you, people are available who can give you free, confidential help and advice. Please visit REACHOUT at <http://www.reachout.asn.au> or if you are in urgent need of counselling, call lifeline (24 hour service) on 131 114. You can also contact your local mental health centre or community health centre - phone numbers are on the NSW Health website at <http://www.asnsw.health.nsw.gov.au/policy/cmh/cons.html> or <http://www.health.nsw.gov.au/health-public-affairs/youthhealth/contacts.html> or you can call the NSW Health switchboard on 02 9391 9000 for details of services in your area.

## DRIVE: QUESTIONNAIRE

### Sleep

The following questions relate to your usual **sleep habits** during the past month **ONLY**. Please give your answer for the majority of days and nights in the past month.

**D16. During the past month, about how long have you slept for each night?**

WEEKDAYS

|\_|\_| hours

WEEKENDS

|\_|\_| hours

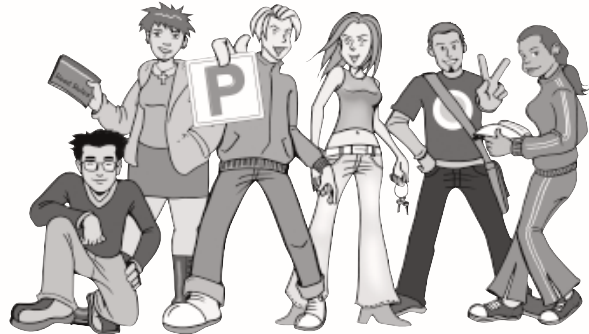
**D17. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?**

Not during the past month

Less than once a week

Once or twice a week

Three or more times a week



**This is the end of the questionnaire**

#### IMPORTANT!

Please check:

- You have answered all the questions in each section
- You have signed the consent form

Please place the completed questionnaire and signed consent form in the reply paid envelope and mail it back to us (no stamp needed).

OR

you can mail the questionnaire to us  
(no stamp needed) at:

**Institute for International Health  
Reply Paid 76262  
Newtown NSW 2042**

If these questions have brought up any issues for you, people are available who can give you free, confidential help and advice. Please visit REACHOUT at <http://www.reachout.asn.au> or if you are in urgent need of counseling, call lifeline (24 hour service) on 131 114. You can also contact your local mental health centre or community health centre - phone numbers are on the NSW Health website at <http://www.asnsw.health.nsw.gov.au/policy/cmh/cons.html> or <http://www.health.nsw.gov.au/health-public-affairs/youthhealth/contacts.html> or you can call the NSW Health switchboard on 02 9391 9000 for details of services in your area.

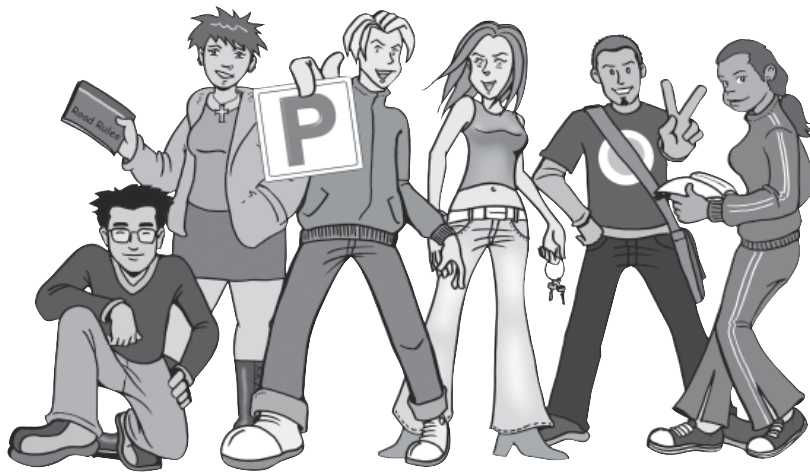
**Thank you very much for your help!**

*We will send you a movie ticket when we have checked that you are eligible and have completed all sections of the questionnaire.  
This may take a few weeks. Thanks for your patience.*



THE GEORGE INSTITUTE  
*for International Health*

Reply Paid 76262 · Newtown · NSW 2042



# DRIVE

**This booklet contains:**

- Instructions
- Questionnaire



**Motoring & Services**

Proudly supporting the DRIVE study resurvey

## DRIVE: INSTRUCTIONS

1. Please answer **every** question in all 3 sections of the **Questionnaire**
2. When you have finished, please place this booklet in the **reply-paid envelope** and post it in an Australia Post mailbox.

**Do you want to find out more about the study, or ask someone how to fill in the questionnaire? If so,**

please call                      Stephanie Blows: (02) 9993 4585  
    Rebecca Ivers: (02) 9993 4539  
    Toll-free: 1800 01 33 01

or email                              [drive@thegeorgeinstitute.org](mailto:drive@thegeorgeinstitute.org)

The Human Ethics Committee of The University of Sydney has given approval for the conduct of this project. Any person with concerns or complaints about the conduct of a research study can contact the Manager of Ethics and Biosafety Administration, University of Sydney, on (02) 9351 4811.

**Thank you for giving up your time  
to help make the roads safer!**



# DRIVE: RESURVEY QUESTIONNAIRE

Your driver's licence number:

Write your licence number exactly as it appears on your licence. Please do not write the 'card number'.

Your date of birth:

 /  /   
day month year

Today's date:

 /  /   
day month year

## Section A

### Your driving

**A1** Do you have regular access to a car, van, truck or similar vehicle to drive?

Please tick the vehicle that you use most often

*Tick one box only*

- No  → Go to question A5
- Yes, my own car
- Yes, parent's or family car
- Yes, other car (eg friend's)

**A2.** What sort of vehicle is it?

Make (eg Ford) \_\_\_\_\_

Model (eg Capri) \_\_\_\_\_

Year (eg 1977) \_\_\_\_\_

Engine Capacity (eg 1.9 L) \_\_\_\_\_

**A3.** Has the vehicle you mostly drive been modified?

(For example: suspension raised or lowered, wide tyres, non-standard additions or body kits such as side skirts, bumper additions, muffler)

- Yes
- No  → Go to question A5
- Don't know

**A4. If yes, please detail modifications:**

---

**A5.** During an average week, about how long (to the nearest hour) do you spend:

*If none, please write '0' and go to question A7*  
*If you aren't sure, please give an estimate*

**DRIVING** a car, van, truck or similar vehicle  hours

**DRIVING** on rural or country roads  hours

**DRIVING** between 10pm and midnight  hours

**DRIVING** between midnight and 5am  hours

**A6.** What is the main purpose for your driving?

*Please tick one box only*

- Social/ recreation
- Commuting (driving to or from work)
- Other work related travel (including farm work)
- Education/childcare
- Shopping
- Personal business
- Trips to drop off/pick up (or accompany) someone
- Other

**A7.** Have you attended any practical driver training courses for car driving in the last year?

*(For example: advanced, defensive or low risk driver training.)*

- Yes
- No  → Go to question A9

# DRIVE: RESURVEY QUESTIONNAIRE

**A8.** If yes, where was the practical part of the course conducted?

Please tick one box only

At a closed venue (closed road or racetrack)

On public roads

Both at a closed venue and on public roads

**A9.** In the last year, were you involved in a crash ON the road (on a public road where anyone may drive), where you were the driver of a car, van, truck or similar vehicle?

No  → Go to question A12

Yes

**A10.** If yes, how many crashes were you involved in where:

If none, please write '0'

There was no damage to a vehicle and no one was injured \_\_\_\_\_

There was minor damage to a vehicle but no one was injured \_\_\_\_\_

There was major damage to a vehicle but no one was injured \_\_\_\_\_

Someone was injured but did not need to be hospitalised \_\_\_\_\_

Someone needed to be hospitalised \_\_\_\_\_

Someone was killed \_\_\_\_\_

**A11.** In the most severe ON road crash you had in the past year, what type of vehicle were you driving at the time of the crash?

Make (eg Ford) \_\_\_\_\_

Model (eg Capri) \_\_\_\_\_

Year (eg 1977) \_\_\_\_\_

Engine Capacity (eg 1.9 L) \_\_\_\_\_

**A12.** In the last year, were you involved in a crash OFF the road (on private property such as farm paddocks; carparks; beaches; or race tracks), where you were the driver of a car, van, truck or similar vehicle?

No  → Go to question A14

Yes

**A13.** If yes, how many crashes were you involved in where:

If none, please write '0'

There was no damage to a vehicle and no one was injured \_\_\_\_\_

There was minor damage to a vehicle but no one was injured \_\_\_\_\_

There was major damage to a vehicle but no one was injured \_\_\_\_\_

Someone was injured but did not need to be hospitalised \_\_\_\_\_

Someone needed to be hospitalised \_\_\_\_\_

Someone was killed \_\_\_\_\_

**A14.** In the last year, did you receive a traffic conviction for an offence YOU committed while driving?

No  → Go to question A16

Yes

**A15.** If yes, how many convictions? \_\_\_\_\_

**A16.** In the last year, were you stopped and "cautioned" or "warned" by the police for something YOU did while driving?

No  → Go to question A18

Yes

**A17.** If yes, how many times? \_\_\_\_\_

## Driving habits and opinions

The next questions are about your current driving habits and opinions.

**A18.** When YOU are driving, how safe do you think the following are?

Please tick one box on each line

	Always safe	Mostly safe	Some-times safe	Rarely safe
Driving at 70 km/h in a 60 km/h speed zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving at 110 km/h in a 100 km/h speed zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving with a blood alcohol level just over the legal limit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving after smoking marijuana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving a poorly maintained car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Going through a red light	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving while talking on a mobile phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving with 2 or more passengers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving between midnight and 6am	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving while using SMS (text messaging) on a mobile phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**A19.** How would you rate YOUR driving ability compared to other drivers at the same stage of licensing as yourself?

Much better

Better

About the same

Worse

Much worse

**A20.** How would you rate YOUR driving ability compared to other drivers in general?

Much better

Better

About the same

Worse

Much worse

**A21.** During the past 4 weeks, how often did you drive a car or other vehicle when you had been drinking alcohol?

Never	Once or twice	3 or more times	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**A22.** During the past 4 weeks, how often did you drive a car or other vehicle when you had been smoking marijuana?

Never	Once or twice	3 or more times	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



# DRIVE: RESURVEY QUESTIONNAIRE

**A23. How often do you:**

Please tick one box on each line

	Very Often	Often	Some-times	Hardly Ever	Never
Drive fast just for the thrill of it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take some risks when driving because it makes driving more fun?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive at about 70km/h in a 60km/h speed zone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do burnouts, donuts, or skids just for the fun of it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speed up if someone is trying to pass you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Follow very close behind slower drivers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make rude gestures at other drivers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Honk your horn or flash your lights in anger at other drivers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Race or drag race for the fun of it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive without wearing a seatbelt?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive while talking on a mobile phone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive while listening to loud music?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive with 2 or more passengers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive while using SMS (text messaging) on a mobile phone?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The next question contains statements about how people think and act.

**D24.**

Please read each statement carefully and decide whether the statement on the whole DESCRIBES YOU (tick TRUE) or on the whole DOES NOT describe you (tick FALSE).

Please answer either True or False to every statement even if you are not entirely sure of your answer.

	TRUE	FALSE
I tend to begin a new job without much advance planning on how I will do it	<input type="checkbox"/>	<input type="checkbox"/>
I usually think about what I am going to do before I do it	<input type="checkbox"/>	<input type="checkbox"/>
I often do things on impulse	<input type="checkbox"/>	<input type="checkbox"/>
I very seldom spend much time on the details of planning ahead	<input type="checkbox"/>	<input type="checkbox"/>
I like to have new and exciting experiences and sensations even if they are a little frightening	<input type="checkbox"/>	<input type="checkbox"/>
Before I begin a complicated job, I make careful plans	<input type="checkbox"/>	<input type="checkbox"/>
I would like to take off on a trip with no pre-planned or definite routes or timetables	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy getting into new situations where you can't predict how things will turn out	<input type="checkbox"/>	<input type="checkbox"/>
I like doing things just for the thrill of it	<input type="checkbox"/>	<input type="checkbox"/>
I tend to change interests frequently	<input type="checkbox"/>	<input type="checkbox"/>
I sometimes like to do things that are a little frightening	<input type="checkbox"/>	<input type="checkbox"/>
I'll try anything once	<input type="checkbox"/>	<input type="checkbox"/>

- |   | TRUE                     | FALSE                    |
|---|--------------------------|--------------------------|
| I would like the kind of life where one is on the move and travelling a lot, with lots of change and excitement | <input type="checkbox"/> | <input type="checkbox"/> |
| I sometimes do 'crazy' things just for fun  | <input type="checkbox"/> | <input type="checkbox"/> |
| I like to explore a strange city or section of town by myself, even if it means getting lost                    | <input type="checkbox"/> | <input type="checkbox"/> |
| I prefer friends who are excitingly unpredictable   | <input type="checkbox"/> | <input type="checkbox"/> |
| I often get so carried away by new and exciting things that I never think of possible complications             | <input type="checkbox"/> | <input type="checkbox"/> |
| I am an impulsive person  | <input type="checkbox"/> | <input type="checkbox"/> |
| I like 'wild' uninhibited parties   | <input type="checkbox"/> | <input type="checkbox"/> |



## Section B

### Your lifestyle

- B1. How often do you have a drink containing alcohol?**
- Never  → *Go to question B4*
- Once a month or less
- 2-4 times a month
- 2-3 times a week
- 4 times a week or more

*For the next 2 questions please refer to the following standard drink guide.*

**Each of these is equal to one standard drink:**

	=		=		=		=	
425 mL Light beer		285 mL Regular beer		100 mL Wine		60 mL Fortified wine		30 mL Spirits

- B2. How many drinks of alcohol would you have on a typical day when you are drinking?**
- 1 or 2
- 3 or 4
- 5 or 6
- 7, 8 or 9
- 10 or more
- B3. How often would you have six or more drinks on one occasion?**
- Never
- Once a month or less
- 2-4 times a month
- 2-3 times a week
- 4 times a week or more

**B4. About how often have you used marijuana (cannabis) in the last 12 months?**

- Never
- Once a month or less
- 2-4 times a month
- 2-3 times a week
- 4 times a week or more

**B5. About how often have you used other recreational drugs in the last 12 months?**

- Never
- Once a month or less
- 2-4 times a month
- 2-3 times a week
- 4 times a week or more



**Your feelings**

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

**B6. During the past 4 weeks....**

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
How often did you feel tired out for no good reason?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel nervous?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel so nervous that nothing could calm you down?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel hopeless?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel restless or fidgety?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel so restless you could not sit still?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel depressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel that everything was an effort?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel so sad that nothing could cheer you up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often did you feel worthless?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**B7.** In the past 12 months have you deliberately hurt yourself or done anything that you knew might have harmed you or even killed you?

Yes

No

If yes, what was it that you did?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If these questions have brought up any issues for you, people are available who can give you free, confidential help and advice. Please visit REACHOUT at <http://www.reachout.com.au> or if you are in urgent need of counselling, call Lifeline (24 hour service) on 131 114.

You can also contact your local mental health centre or community health centre – phone numbers are on the NSW Health website at <http://www.asnsw.health.nsw.gov.au/policy/cmh/cons.html> or <http://www.health.nsw.gov.au/health-public-affairs/youthhealth/contacts.html> or you can call the NSW Health switchboard on 02 9391 9000 for details of services in your area.

**Section C**

**Your Contact Details**

**C1.** Your name:

**C1.1** First or given name

\_\_\_\_\_

**C1.2** Surname or family name

\_\_\_\_\_

**C2** Your address:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ | Postcode

**C.3** Your email address

\_\_\_\_\_ @ \_\_\_\_\_

**This is the end of the questionnaire**

**Study results**

We will occasionally write to you about the progress of the study. If you do not wish us to do this please let us know by either emailing us at [drive@thegeorgeinstitute.org](mailto:drive@thegeorgeinstitute.org) or leave a message on 1800 01 33 01. The results will also be posted on The George Institute website ([www.thegeorgeinstitute.org](http://www.thegeorgeinstitute.org)).

If these questions have brought up any issues for you, people are available who can give you free, confidential help and advice. Please visit REACHOUT at <http://www.reachout.com.au> or if you are in urgent need of counselling, call **Lifeline** (24 hour service) on **131 114**.  
You can also contact your local mental health centre or community health centre – phone numbers are on the NSW Health website at <http://www.asnsw.health.nsw.gov.au/policy/cmh/cons.html> or <http://www.health.nsw.gov.au/health-public-affairs/youthhealth/contacts.html> or you can call the NSW Health switchboard on 02 9391 9000 for details of services in your area.

**Thank you very much for your help.**

**You have made a valuable contribution to road safety and we appreciate your efforts.**