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Cautiousness in young rural and semi-rural drivers: Are there influencing factors?

Abstract

All drivers have to be prepared for driving with changed conditions, either intrinsic or external to the vehicle. This study explores factors influencing the cautiousness while driving of high school students in a rural and small semirural town community in New South Wales. Perceptions of caution in response to a range of different conditions including driving with passengers, bad weather, driving an unfamiliar car, poor road conditions, driving in heavy traffic and darkness - all conditions which have the potential to affect driving style or speed - were reported. Many of the young rural students reported having started to drive at a very young age (often off-road). This reduced their reported perceptions of caution in their later driving, on-road, post-licence. Previous involvement in a crash was linked with a less cautious approach to changed lighting conditions when driving. Targeted road safety campaigns for young rural drivers may be needed which focus upon promoting specific rural road hazard perception and awareness of the implications of speed and changed road conditions on driving style and cautiousness.

Keywords

there, influencing, rural, semi, factors, cautiousness, young, drivers

Disciplines

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Cautiousness and driving in young rural and semi rural drivers: are there influencing factors?

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Abstract:

All drivers have to be prepared for driving with changed conditions, either internal to the vehicle, for example with additional passengers or external to the vehicle, for example changes in road condition or bad weather.

Experienced drivers, for whom these changes in conditions are familiar, and often encountered, may adapt their driving style to changes in conditions automatically; whereas those less experienced in road driving may react differently, and be more aware of their decisions to change styles.

This quantitative study focused upon possible influencing factors for young people to the caution they would apply in their changed driving behaviours with different conditions; driving with passengers, bad weather, driving an unfamiliar car, poor road conditions, driving in heavy traffic and darkness. These are all conditions which have the potential to impact on driving style, or speed. The study also sought to establish if there were any linkages between other aspects of the individual young person which may impact on their view of caution in driving.

The key findings show that there are differences in the cautiousness of young people which are related to their place of residency, rural or semi rural. However, the most predictive factor of levels of cautiousness is the age at which driving started, with those who start well below the licensing age reporting significantly less caution to different situations. Previous involvement in a crash is linked with a less cautious approach to changed driving conditions.

driving styles [11]. Caution about breaking driving rules was constrained by parental supervision, with those who have the most restrictive supervision having the most cautious attitudes.

A cautious driving style may be a factor which limits high risk behaviours whilst driving, [8,]there is evidence that driving styles may be influenced by the driving styles of parents of new drivers, as well as by the young drivers personality [12]. This study demonstrated that there are links between parental driving styles and those of the new driver, with anxiety and anger being the most significant traits.

In our previous qualitative research [13] we have identified some trends and perspectives which may be unique within young rural Australian people. The **aim** of this study was to explore how cautious whilst driving high school students were and to consider factors which may predict self reported cautiousness across a range of different driving situations.

This research may give an indication of factors influencing cautiousness in driving which are unique to young rural drivers- a subset of drivers who are more dependent on driving than young urban drivers, partly as they usually do not have access to public transport.

Method:

Context: The two areas were distinctly different; Tumut is in a rural area, with agriculture being a major employment area. Tumut is a small town, with the nearest regional centre being Wagga Wagga, which is 102 kms away. It is serviced by rural roads, with fewer features for traffic control (for example traffic lights, roundabouts and filter lanes) than in more populous regions. Another characteristic pertinent to this research are the lack of locally available professional driving school provision, and lack of any public transport system leading to more reliance on driving. The location would be indicative of variance in factors such as road types and condition, with there being a high proportion of unsealed roads

The expected range of weather condition experienced whilst driving in the region is considerable, with winter frosts which affect pavement conditions, and a significant annual rainfall. There is also the possibility of snow on the higher altitudes of the region.

The comparison school was Kiama High School, which is semi rural, being in the heart of a predominantly dairy industry area, although adjacent to large regional centres of Wollongong (population 200,000) and Nowra, (32,000). Within a ten minute drive of Kiama CBD, all major road structures, like traffic lights, roundabouts, multilane roads, multi lane intersections, can be experienced.

Participants:

The participants were selected for the survey from years 9-12, which involved an age range from 13 to 18 years. All those who returned a signed parental consent form completed the survey in the schools. The rationale was to gauge responses from a group which included those who were not yet eligible to obtain a driving license, but who may be driving for a variety of reasons. The age range included the crucial stage of gaining a driving license, which for both the experienced off road driver and the total novice driver are attained at the same age. The benefits of gaining responses to the survey over such a wide age range are that it will allow comparison of results across the age ranges and experiences.

Instrument:

A short (four paged) survey instrument was developed which collected demographic information, information about age of onset of driving, reasons for this early driving, frequency of driving, teachers of driving skills and attitudinal information on cautiousness, risk taking,

differences between rural and urban driving, involvement in crashes, and responses to road safety campaigns. The instrument was developed following focus groups with young rural drivers, in order to quantify some of the concepts which were discussed within the focus group settings. The survey was piloted with ten young people to confirm that it was worded appropriately, and amendments incorporated into the final document.

The topics which were to be rated for cautiousness were determined by responses in earlier focus groups with young people [13], and are all topics which will be experienced by new drivers; there was a range of factors intrinsic to the vehicle (driving with passengers, driving an unfamiliar car) and external to the car (bad weather, darkness, roads in poor condition, driving in heavy traffic).

Analysis

Initial analysis was performed using uni-variate methods to determine association between responses to the individual questions and other characteristics. In statistically testing this data, the 5 point scales used were grouped; the three scores representing a less cautious view (would never, rarely or sometimes affect my driving) were grouped, as were: would often, and would always affect my driving, as a more cautious view. These were then analysed for association against location of school, gender and previous involvement in a crash as driver using Chi Square test.

Principle component analysis was performed **on the cautiousness ratings and demographic** after excluding missing variables. A one factor solution with an Eigen value of 3.748 explained 62% of the variance. The variables were then summed and averaged to give a total score. This was then examined for association with the location of school, gender, whether grew up on a property, age when started to drive, whether father taught the child to drive and previous involvement in a crash as driver or passenger using multivariate regression (SPSS Version 17).

Ethics:

Prior to use of the survey instrument, permissions were sought and obtained from the Human Research Ethics Committee at UNSW and the NSW Government Department of Education and Training Ethics in Schools Research Committee.

Results: 217 high school pupils in Tumut and 235 in Kiama completed the survey. These represented 82% and 74% of the pupils in the schools in the year groups surveyed. Those who did not respond to the survey were either not at school on the day of the survey's administration, or had not returned parental permission letters to take part in the survey. (**Table 1**).

Of those surveyed, the majority, 90.5% reported to have had some driving experience, on or off road. Some of those who had not had any driving experience (n=31) did not complete the questions related to aspects of driving behavior, including cautiousness. Within Australia, it is common practice for young people in rural areas to experience early (pre licensing age) driving on private property, off road, either for leisure, or to help on rural properties or for a combination of these reasons. This is demonstrated in the figures above for those who drive, and also for those who have started to drive at 15 years or below,(n=293) with the youngest reported age of starting to drive being 4 years.

Additionally, the survey asked who had taught driving skills, and who was the main teacher. Parents were the most frequent teachers of driving skills, with the father the main teacher in both localities. Other survey questions were concerned with: rating potential risk factors for crashes, personal experience of crashes as either a passenger or driver, skills specific to urban and rural driving, and self rated driving skills, both on and off road.

Cautiousness: Within the survey, the question concerning cautiousness required the respondent to rate a series of six factors which may impact on their cautiousness when driving. There was a combination of factors: inside the vehicle- driving with passengers; vehicle related- driving an unfamiliar car; external factors- heavy traffic, bad weather, darkness and roads in poor condition. The question asked for a judgment on how much each factor might affect driving, with a five point scale from "would never affect my driving" through to "would always affect my driving".

A cautiousness scale was developed which grouped the responses into two categories: the three scores representing a lesser amount of caution (would never, rarely or sometimes affect my driving) and more caution (would often, and would always affect my driving). Using these categories, the results were then cross tabulated with independent variables - the region, gender, early driving experience and previous involvement in a crash as a driver or passenger.

Location of School:

There were significant associations between reported cautiousness while driving and location of school (Table 2). Students at Kiama reported higher cautiousness than the Tumut group when driving in bad weather ($\chi^2 = 8.4$, $p < .003$), driving with passenger ($\chi^2 = 2.9$, $p < .027$), and driving in an unfamiliar car ($\chi^2 = 6.6$, $p < .007$). There was no significant difference between the two regions for driving in darkness, with poor road conditions and driving in heavy traffic.

Age started to drive: Students who started to drive at a younger age were less likely to report caution. Students who started to drive at or below 12 years of age more likely to report that the following would rarely or never affect their driving compared with those who started after 12 years:-

- bad weather (39.9% compared to 20.9% $\chi^2 = 27.8$, $p < 0.001$)
- driving with passengers (70.7% compared to 53.1% $\chi^2 = 18.8$, $p = 0.001$)
- darkness, (49.4% compared to 40.7% $\chi^2 = 12.7$, $p = 0.01$),
- road conditions (50.8% compared to 30.3% $\chi^2 = 21.8$, $p < 0.001$)
- driving an unfamiliar car (39.9% compared to 20.9% $\chi^2 = 27.8$, $p < 0.001$).

There was no association between age started to drive and caution in heavy traffic.

Gender influences: There was a significant association between gender and cautious driving with poor road conditions, males were significantly less cautious than females (72.5% compared to 63.9% $\chi^2 = 3.6$, $p < .037$). However, there were no other significant differences by gender.

Previous involvement in a crash, as a driver: There was a significant negative association between previous involvement in a road crash as a driver and reported cautious driving in relation to driving in darkness. Those who had previous crash experience were less likely to report greater caution in darkness (92.3% compared to 75.7% $\chi^2 = 3.8$, $p < .035$). There were no significant associations between previous involvement in a crash and other cautious driving indicators.

Multiple regression analysis:

Multivariate regression analysis, based on factor analysis, was conducted with the summed cautiousness score from the 6 questions¹ as an independent variable and school, gender, where the student grew up, age when they started to drive and whether father taught the student to drive and previous involvement in a crash as predictors (Table 3). Age started to drive (Table 4) and previous involvement in a crash were associated with cautiousness ($p < 0.001$). Students who started to drive at an older age reported more caution, whereas those who had previous involvement in a crash were less cautious. The other variables were not significant.

This demonstrates that the age at which students start to drive is the predictor for how they view different factors which impact upon the cautiousness they would apply to driving and that experience of driving may tend to reduce cautiousness.

¹That is the scores are summed to give a cautiousness score between 6 ,meaning that no factor would affect driving, to 30 meaning all of the factors would always affect driving.

Discussion:

The majority of those who completed the survey were early drivers, having driving experience prior to usual licensing age. As *age started to drive* was demonstrated to have a significant effect on cautiousness, this factor may be significant in relation to either health promotion campaigns relating to driving in young people, or to graduated licensing schemes which may not recognise the diversity of experience in novice license holders from rural areas. The linkages between cautiousness and crash involvement indicate a higher propensity to take risks, particularly when driving in darkness.

There were differences between the two locations; with bad weather being rated as more likely to have an impact on driving in Kiama. This may be related to the area's coastal position, and the winter fogs, or to its higher level of rainfall. By comparison, Tumut would have colder weather, including ice on roads, during the winter months. The results also show that the respondents from Tumut would be less cautious with passengers on board, and when driving an unfamiliar car. The students from Kiama are, generally, more cautious in their views about factors, intrinsic and extrinsic to the vehicle, which may affect their driving. In summary, there were significant differences between the two locations in responses to all the factors except driving in heavy traffic. The experience of heavy traffic may be variable dependent on the location, with Kiama being closer to urban conurbations and experiencing heavy seasonal traffic as it is both a holiday destination, and experiences heavy through traffic seasonally as visitors access the South Coast. Tumut, by contrast is not an area which constantly has heavy traffic, so the students would be less familiar with driving in it.

There was less difference between cautiousness scores between males and females than was expected.

This is one of the first studies in which young rural people in Australia have report greater caution when driving. Although there were differences between those living in semi-urban and rural environments in the univariate analysis, overall cautiousness was only associated in the multivariate analysis with age the student started to drive and previous involvement in a crash .

Students who were older when they first started to drive reported increased caution compared to those who started at early age; students who started to drive at a younger age were less likely to report increased caution in each of the conditions except driving in heavy traffic. Early life experience of living on a rural property may give students greater confidence by comparison

with those with less experience. In a review of licensing ages, [3] the origins of early licensing, in United States, Canada and New Zealand is attributed to earlier agriculturally based economies, where the need for young driving was the consideration for age of licensing. This review highlights the continuing debate concerning appropriate age of licensing for optimum crash rate reduction in young drivers, and the benefits, at all ages of licensure, of a graduated licensing scheme with restrictions on night time and passenger bearing driving. The results of this study appear to support this, although with a group with many young drivers with pre licensing experience.

Students who had had previous involvement in a crash as driver or passenger reported less caution than those who did not. We do not know the extent of these crashes. It may be that many of these were minor and having escaped relatively unharmed the perceived risk of harm through crash involvement is lessened. Research indicates [17] that risk of injury is associated with high risk behaviours; conversely, if a high risk activity is observed to have been taken multiple times with no negative consequences (an example may be frequent driving without using seat belts, or using a quad bike without helmets), then the tendency to continue with the high risk activity will not necessarily be modified by the experience of negative outcomes. The same applies to someone who has been involved in a crash, with limited adverse results.

Social cognitive theory [18] suggests that the influences on behaviours are varied, and include environmental, individual and developmental factors, which interrelate to influence behaviours. This theoretical basis [19] can be clearly related to how skills are acquired and practiced in driving, and how using these skills (or amount of experience) reduces the need for focusing on these skills. This skill development with practice and in a staged development model is the basis of graduated driving schemes [20,21]. The key elements of these schemes to produce skills are extended periods of supervised driving, in which the skill learning period is extensive, with usually minimum number of hours needed to progress to unsupervised driving. However, there is limited evidence that the age at which the driving experience is obtained has an impact on later driver safety.

Many of those involved in this study had much vehicle handling time, to develop and hone their skills, in early, off road driving. This usage of driving skills allows for skills to develop, and to evolve from being a “new” and emerging skill into a practiced set of actions which are performed with increasing skill gained through experience. However, a model which

demonstrates and explains linkages between beliefs, intentions and behaviours, in the context of specific environments[22] is in the domain of risk theory, as developed in the model below:

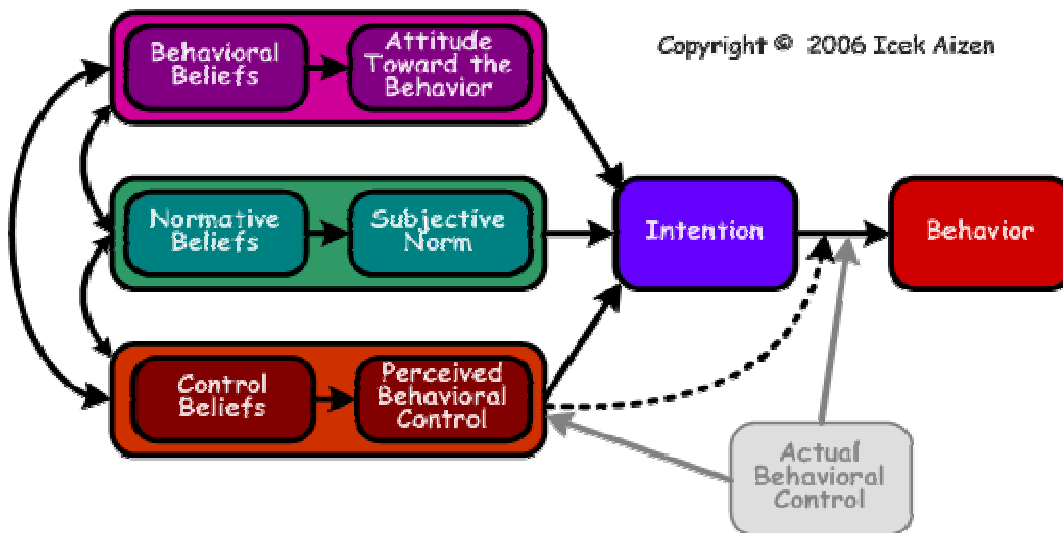


Figure 1: Theory of planned behaviour

This model defines three belief sets which have influence on intention to take risk, and on risk behaviour. The behavioural beliefs are those which an individual forms, based upon their own experiences and values. Within a rural community, of which Tumut is an example, these behavioural beliefs are based upon, for many, their individual experiences of early driving. It is widely reported that the value of being able to drive is an important stage in adolescent development [3] particularly in rural, agriculturally based areas.

These are influenced by the normative beliefs of the community of which the individual is a member, in this case a rural NSW where it is a commonplace activity for very young people to learn to drive, for leisure, to drive across a property to get to the school bus, or to help on a property[14]. It may be that these behavioural beliefs and their formative foundations are as pertinent to the formation of views of cautiousness, which reduces risk taking, as to the risk taking actions or behaviours.

In a study of intentions towards high risk taking driving, either with excessive speeding or drink driving [12] the theory of planned behaviour was applied to explaining the influence of parental

driving supervision on the factors affecting driving intention, and ultimately therefore on driving behaviours. The results demonstrated that, when parental supervision was 'strongest', there was least intention to be involved in high risk driving by those in the sample.

Understanding why the experience of early driving, often with associated responsibility for tasks on a rural property, may have an impact on reduced attitudes to being cautious in on road driving situations may be explained by the increased experience that this early driving has given to the young people; it may also be that, if the subjective norm of driving on a property for work related practice is not "cautious" that is, for example seat belt usage is disregarded, there are no specific rules, compared with on the roads, even the practice of allowing and/or encouraging young people to drive indicates that this is a normative belief.

A further study based upon the theory of planned behaviour, in relation to the intention to speed in two contrasting road conditions by experienced motorcyclists [15] demonstrated that there predictors of intention were dependent on the situation. Intending to speed on divided roads with a 70mph limit was predicted by self belief and group norms, those to speed on an urban road with a speed limit of 30kph were concerned with attitude and perceived control. It may be that there are similar variations in this study on cautiousness which have been influenced by learning to drive in situations which are different and distinct from the on road driving environment; for example speed is not a consideration in off road driving on a property. The early off road driving is completed in situations unlike those on the road where there are speed limits, road rules and signage.

To establish if there are linkages between perceptions, beliefs and emergent behaviours would require long term observational data to be collected, and comparisons between observed behaviours and expressed perceptions and beliefs to be made, which was outside of the scope of this study.

Limitations of the study of the two surveys are that they were both carried out with those attending school, and as such may not have included those who did not attend school for either a valid or invalid reason, for instance truancy, and therefore may have missed the views of some who may have more extreme tendencies to risk taking, as other research has shown that habitual risk takers are often also poor attendees at school [17]. The study also excludes those who may have chosen to leave school early before completing their HSE. However, it did capture all the responses from the pupils in a wide age range attending school, and with permission to participate, on a particular day, and has the results from 452 students.

Conclusions:

In conclusion, the experiences of young drivers, have an influence on their perception of factors which would affect their cautiousness in driving, and on their risk taking behaviours.

In relation to road safety campaigns, the implications are that recognition of both the driving experience prior to licensing of some rural young drivers, and the apparent behavioural norms in a rural region may warrant a special case for tailored rural campaigns. These may relate to the acknowledgment of vehicle handling skills, but also recognise the need for development of on road hazard perception, specific to rural driving.

It may also be pertinent to develop road safety campaigns which emphasise the development of staged skill development for families to teach their young people in off road driving situations on properties; this could reflect the models used in graduated driving schemes.

Both these health promotion campaigns would potentially complement the advances which the graduated licensing schemes have made in reducing the crash toll in young drivers.

Table I: Characteristics of the young people:

	Tumut	Kiama
Age range (years)	13-18	14-18
Male	n=103	n=129
Female	n=114	n=106
Live on a property	n=62 (28.6%)	n=37 (15.7%)
Started to drive at 15 years or under	n=171(78.8%)	n=124 (52.8%)
Have driving experience	n=206 (94.9%)	n=199 (84.7%)
Learnt to drive to help on the property	n=70 (32.3%)	n=18 (7.7%)
Father was main teacher	n=124 (57.1%)	n=118 (50.2%)

Table 2: Cautiousness: Proportion of students reporting influence of particular situations on their driving by school (Tumut n=217, Kiama n=235)

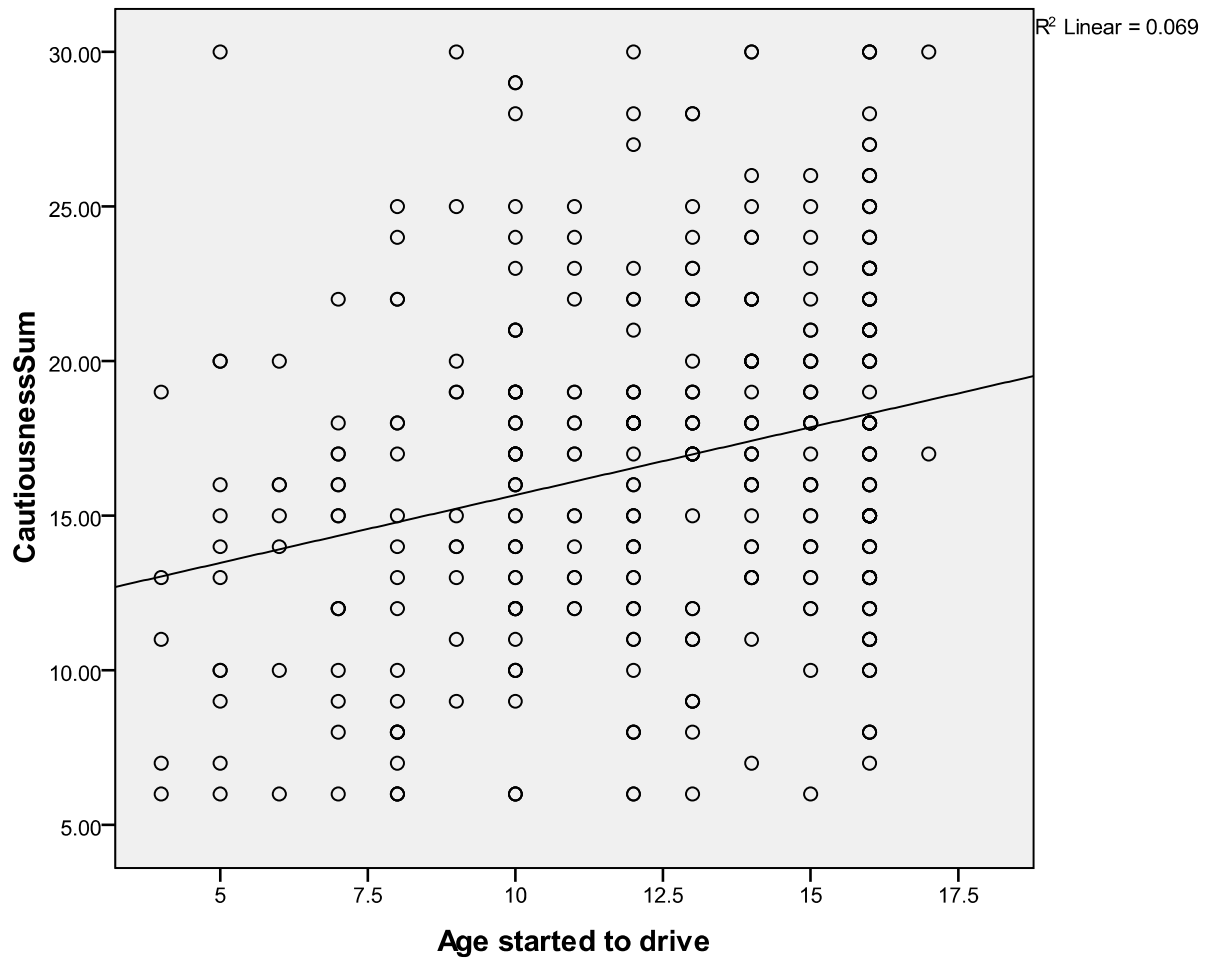
		Would never affect my driving		Would rarely affect my driving		Would sometimes affect my driving		Would often affect my driving		Would always affect my driving		Nil response	
		n	%	n	%	n	%	n	%	n	%	n	%
Bad weather	Tumut	30	13.8	41	18.9	76	35.1	25	11.5	30	13.8	15	6.9
	Kiama	14	6	37	15.7	79	33.6	52	22.1	37	15.7	16	6.8
Driving with passengers	Tumut	63	29	73	33.6	45	20.7	10	4.6	11	5.1	15	6.9
	Kiama	53	22.6	65	27.7	65	27.7	25	10.6	11	4.7	16	6.8

Darkness	Tumut	50 23	48 22.1	61 28.1	26 12	17 7.8	15 6.9
	Kiama	24 10.2	65 27.7	75 31.9	32 13.6	23 9.8	16 6.8
Roads in poor condition	Tumut	36 16.6	49 22.6	59 27.2	32 14.7	26 12	15 6.9
	Kiama	15 6.4	43 18.3	85 36.2	50 21.3	26 11	16 6.8
Driving an unfamiliar car	Tumut	32 14.7	53 24.4	78 35.9	21 9.7	18 8.3	15 6.9
	Kiama	22 9.4	57 24.3	74 31.5	47 20	19 8.1	16 6.8
Driving in heavy traffic	Tumut	28 12.9	49 22.6	57 26.3	37 17.1	31 14.3	15 6.9
	Kiama	30 12.8	60 25.5	62 26.4	40 17	27 11.5	16 6.8

Table 3: Estimates of regression coefficients for multivariate regression analysis of cautiousness sum. $R^2 = 0.086$,

Constant	Coefficient		Correlation with cautiousness sum
	Adjusted β coefficient	95% confidence interval for β	
School (Tumut, or Kiama)	0.032	-0.82 to 1.52	.107
Gender	0.038	-0.71 to 1.55	.091
Grew up on a property (Y /N)	-0.01	-1.43 to 1.17	-.103
Age started to drive(yrs)	0.228	0.19 to 0.57	.262
Father taught to drive(Y/N)	-0.036	-1.54 to 0.72	-.062
Involvement in a crash, as driver or passenger	-0.118	-2.61 to -0.24	-.135

Table 4: Cautiousness score and age started to drive:



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