AN EVALUATION OF A PREDRIVER TRAINING PROGRAM USING THE THEORY OF PLANNED BEHAVIOR (TPB)

1. BACKGROUND

The Youth Driver Development Program has been operating for 8 years, targeting high school students (aged 15/16 yrs). The program delivers driving skills while raising safety and awareness in participants. Evaluation of within participant changes on risky driving (Deery & Love 1996) and TPB measures (attitude, subjective norm, PBC) was conducted in 2004. Intention to drink drive, speed, drive tired and use a mobile phone while driving were investigated.

2. AIMS

Aims included a test of the TPB in a predriver population and information to alert program managers to best training options to maximise outcomes.

3. SAMPLE

186 year 11 high school students from both public and private schools in the South West of Western Australia.

4. METHOD

Within participant pre-post research design.

5. RESULTS

Deery & Love (1996) scores revealed significant reductions pre to post program for females and no significant difference for males, suggesting reduced risk levels for some participants. Intention to enact was reduced across all four behaviors, although there were gender differences. Regression analyses revealed that attitude was the main predictor of intention. Increased variance in intention was accounted for post program supporting issue of familiarity with behavior being important for change.

6. CONCLUSION

The TPB is a useful evaluation tool and produced results in this population consistent with other research. Familiarity produced greater amounts of variance accounted for in intention. The YDDP appears to have the ability to reduce the intention of predrivers for risky driving behaviors.

Keywords: Predriver training, evaluation, Theory of Planned Behavior

Author details: Catherine Ferguson
Affiliation: Edith Cowan University, Perth, Western Australia
Address: 17a Seashore Mews, BUNBURY, WA 6230
E-mail: caferguson@bigpond.com
Telephone: 61 418 936 147

The Youth Driver Development Program (YDDP) has been operating since 1998 in the South West of Western Australia and is delivered through high schools that choose to participate. The program is designed for pre drivers aged 15 to 16 years and provides participants with driving skills nested in safety awareness and a positive attitude towards safe driving. Driving skills are provided in off-road locations. The program was developed by experienced driver safety professionals who saw the need to take a different approach to youth driver development, particularly with regard to attitudinal training.

The program comprises of five four hour sessions, the first of which is in the classroom and addresses a variety of issues such as the statistics on crash involvement, death and injury for young drivers. A life ladder is constructed for one of the participants, university, work, marriage, children, fame etc. and is then brought back to a situation where all is lost as a result of a crash. This is done to emphasise the effects of risky driving, promote safe driving and is based on anticipated affective regret which has been used with the Theory of Planned Behavior (TPB) (Parker, Manstead & Stradling, 1995). Anticipated affective regret is based on the premise that if an individual thinks about doing something that could have a bad outcome, they will not do that behavior if they have considered the anticipated regret that they will feel in the event of the outcome. The first session also includes a pre driving safety check of the vehicle and theory around vehicle force and movement.

The remaining four sessions are delivered at a variety of locations which provide diverse driving experiences (bitumen and gravel) and during these lessons participants learn basic driving skills and maneuvres. Additionally, the trainers use the time driving to these locations to emphasize safety and provide examples of safe and unsafe driving. Driving time to the locations varies from 10 to 30 minutes.

The application of the YDDP for 15 to 16 year olds was initially based on the age of licensure in Western Australia which was 17 years. The concept was to instill safe driving practices and attitudes towards driving in the year before a learners' permit could be obtained. The age for obtaining a learners' permit in Western Australia has recently been reduced to 16 years with the introduction of a graduated licensing system. The Steering Committee of the YDDP has decided to continue delivery to 15 and 16 year olds as younger participants may not have the maturity required to fully participate in the program.

The evaluation

The evaluation comprised both qualitative and quantitative information. This paper reports the quantitative information which investigated two issues: first that YYDP training reduces potential self-reported risky driving behavior and second, the YDDP makes a positive difference to the behavioral intention of young drivers. Self report does not always represent actual behavior however evidence from both research involving adolescents (Brener, Collins, Kann, Warren & Williams, 1995; Flisher, Evans, Muller & Lombard, 2004; Grimmer, Williams & Pitt, 2000) and research on driver behavior (Lajunen & Summala, 2003; Lawton, Parker, Stradling & Manstead, 1997) has suggested that self report is a useful and reliable method of gathering information.

Extensive research (Lund & Williams, 1985; Mayhew, Simpson, Williams & Ferguson, 1996) has suggested that driver training programs at best make no difference to the driving behavior of participants and at the worst increase risk taking behavior. This is attributed to the perception by drivers who undertake additional training that such additional training produces a 'better' driver who can handle the vehicle more competently and can therefore take more risks.

Historically, driver training programs appear to be skill based whereas the YDDP focuses on attitudinal work in addition to providing basic driver skill training. Attitudinal work is supported in more recent evaluations of driver training (Katila, Keskinen, Hatakka & Laapotti, 2004). It is this attitudinal focus that makes the YDDP different from previous pre-driver and driver training programs. Therefore, the research that reports negative aspects of driver training might not necessarily apply to YDDP which has adopted a holistic approach to predriver education.

The second issue that the YDDP has the potential to make a positive difference to the behavioral intention of young drivers was addressed using the TPB and focuses on behaviors that have been identified internationally as important factors in crash involvement. The behaviors investigated were drink driving, fatigue, mobile phone use and speeding. As the participants in this research are pre drivers, the full TPB model is not used and intention rather than behavior is measured. A model of the TPB is included at the end of this paper (Ajzen, 1991).

Measures

A modified version of Deery and Love (1996) risky driving style questionnaire was used to investigate self reported variations in potential risky driving which might result from participation in the YDDP. The modification involved changing the tense from present to future to account for a pre driving population; for example, the original statement "I take risks" was modified to "I will take risks". The reliability and validity of the original measure is described in Deery and Love (1996). This questionnaire is a general risk measure for driving behavior. Each question was scored 1 – 5 where a lower score represented lower risk. The questionnaire comprises of nine behaviorally phrased questions, therefore the possible scores range from 9 (very low risk) to 45 (very high risk).

The second measure was designed specifically by the researcher and the YDDP trainer and comprised a one page questionnaire based on the TPB. This questionnaire included 16 questions (1 intention, 5 attitude, 1 descriptive norm, 1 general subjective norm and 3 specific subjective norms (parents, friends and driving instructor), 2 motivation to comply (parents and friends) and 3 questions about control). In view of the research context, efforts were made to keep the questionnaire short to avoid participant fatigue and/or disinterest in completion. Four separate but similarly structured questionnaires were prepared addressing each of the four behaviors of drink driving, driving fatigued, mobile phone use while driving, and speeding. In accordance with the TPB specificity of the measures were presented in relation to a vignette. Therefore, the results of this research are specific to the context in which the behavior was presented within the vignette. The vignettes are detailed at the end of this paper. A scale of 1 – 7 was used for the TPB measures with higher scores representing better outcomes.

Participants

A total of 186 participants aged 15 – 16 years (105 females and 81 males) completed the questionnaires. The participants attended both public and private schools in different towns across the South West of Western Australia. The research was conducted during 2004 and participants completed questionnaires at both pre and post program. All program participants invited to complete the evaluation questionnaires complied with the request. Although the program is aimed at pre drivers, seventy six participants (37%) indicated that they already had obtained a learner's permit to drive.

Procedure

Participants and their parents completed consent forms as part of enrolment in the program. An information sheet was supplied to explain the content and nature of the research. The research was approved by the YDDP steering committee. The Deery and Love (1996) risky driving questionnaire and two behavior questionnaires were presented in a repeated measures design. The period pre to post program was five weeks. The same two behaviors were presented at pre and post program to enable the effectiveness of the program in addressing these behaviors to be measured. The questionnaires were presented by the trainers on the first day before the program began and on the last day at the very end of the last training sessions. The questions had a set order of qualitative responses about the program, a TPB questionnaire, the Deery and Love (1996) questionnaire and the second TPB questionnaire. This procedure was used to avoid response bias, boredom and fatigue on the part of respondents.

Results

The results are presented in two sections. First, the risky driving measure is discussed. Second, changes pre to post program for behavioral intention for the four behaviors are presented and discussed together with other results based on the TPB.

Deery and Love (1996) Risky Driving Style Questionnaire

One hundred and eighty six participants completed this questionnaire at both pre and post program. Gender differences are found in most analyses of risky behavior and the YDDP data is no different. Using SPSS for Windows (V9) an ANOVA indicated that significant gender differences existed at both pre and post program, pre program F (1,183) = 1.994, p = .048, post program F (1,183) = 4.729, p = .000.

Exploration of within gender differences was appropriate to determine changes pre to post program and a paired samples t test conducted on the female data revealed a preprogram mean of 17.01 and post program mean of 15.51. This difference was significant t = 4.681, p = .000; effect size 0.36sd (Cohen, 1992). Male data revealed a pre program mean of 18.47 and a post program mean of 18.72. The small increase in the post program mean was not significant, t = -.511, p = .611; effect size 0.04sd (Cohen, 1992).

A frequency analysis of scores collapsed into three dimensions, nil change, negative change, positive change reveals that approximately 11% of the participants recorded no changes pre to post program, 53% lowered their risk and 36% increased it. Table 1 shows the numbers and percentages of movement pre to post program.

Table 1 – Changes by gender on Deery & Love (1996) Risky Driving Questionnaire

	Male		Female		All	
Higher risk (increased score)	39	(48%)	28	(27%)	67	(36%)
Nil change	7	(9%)	13	(12%)	20	(11%)
Lower risk (lower score)	35	(43%)	64	(61%)	99	(53%)

These results might place some question about the effectiveness of the YDDP in reducing risk, however further analyses reveals that 84.6% of female scores and 85.2% of male scores fell between +1sd and – 3 sd of the mean change of - 1.5 points (female) and 0.25 points (male), and overall there was a significant reduction for females and a non significant increase for males.

Discussion of the Deery and Love (1996) Questionnaire

These results suggest that participation in the YDDP reduces potential risky driving for most participants and this might relate to the content of the YDDP in which skill acquisition is nested in safety awareness and a positive attitude towards safe driving. Fifty-three percent of participants' risk scores reduced post program, however there is still a high percentage that either did not change or increased marginally and there are gender differences that require to be addressed. The results are positive as evidenced by the positive medium effect size for females 0.36sd (Cohen, 1992) and the very small negative effect size for males at 0.04sd.

The YDDP cohorts are young adolescents with low risk scores and little driving experience. The mean score for the 2004 cohort was 1.92 and this is stable with the 2003 cohort mean of 1.91 (Ferguson, 2004). It is clear from the different effect sizes in the current research (female 0.36sd and male 0.04sd) that participation in the program benefits girls more than boys. Reasons for this might be cultural where boys are more confident in their driving ability than girls or it might be that girls are more risk averse than boys. There is evidence from other research that both of these issues can play a part in driving behavior (Waylen & McKenna, 2002). It is likely that females are more safety conscious than males and are more amenable to learning, especially at this age (around 16 years).
The YDDP needs to focus on means by which reductions for risky driving in male participants can be achieved so that the excellent results for females can be extended.

The use of the TPB to measure Changes in Intention pre to post program

Paired *t* tests were conducted to investigate changes in behavioral intention for drink driving, driving tired, mobile phone use while driving and speeding. Results by gender are shown in Table 2 below.

Table 2 – Results of paired *t* tests for intention for all four behaviors by gender

	t value	*p* value	Effect Size	Mean Pre program (Scale 1 – 7)	Mean Post program (Scale 1 – 7)
Female					
Intention for Drink driving (df 74)	-2.834	.006	0.28	6.03	6.32
Intention to Drive Tired (df 31)	-3.548	.001	0.69	5.47	6.38
Intention to use Mobile phone while driving (df 21)	-2.828	.009	0.47	5.36	6.16
Intention to Speed (df 61)	-5.200	.000	0.61	5.05	5.89
Male					
Intention for Drink driving (df 49)	-1.032	.307	0.20	6.10	6.30
Intention to Drive Tired (df 29)	-1.728	.095	0.31	4.90	5.37
Intention to use mobile phone while driving (df 19)	-1.162	.259	0.31	5.30	5.75
Intention to Speed (df 39)	-.642	.524	0.08	5.23	5.38

Gender Differences

The results demonstrate that females made significant changes to their intentions across all four situations whereas male scores revealed no significant differences, suggesting that the YDDP is more effective for females than males.
Independent *t* tests for gender were conducted on the pre and post program data. These tests revealed gender differences at both times suggesting that considerable gender differences existed before participants came to the YDDP. Differing group sizes may have affected the *t* test analyses and it is likely that the smaller groups did not have sufficient statistical power to reveal differences (in particular fatigue, n = 62, males = 30, females 32; mobile phone use n = 45, females 25, males 20). This issue of group size is also relevant when the regression analyses (described later in this paper) are considered.

Tests of significance such as the *t* test have been criticized by statisticians for not always producing conclusive results (Hauer, 2004). An alternative method by which to analyse the intention results is to consider the effect sizes of the differences between pre and post program means (Cohen, 1992). This method addresses the

issues of statistical power and can be useful for investigating the size of a change. The effect size is calculated by dividing the difference between the means by the average standard deviation.

Analyses (see Table 2) suggest that for drink driving, the effect size was similar across genders, but for fatigue, mobile phone use and speeding, effect sizes differed with male participants producing less change than females. This is particularly noted for speeding where the effect size of 0.08sd is extremely small. A review of the means for each of these intentions does however reveal that the changes, however small were positive.

The use of effect sizes facilitates comparison and the size of the change is often more meaningful than whether or not the change is significant. An effect size of 0.20 (Cohen, 1992) upwards could be considered a reasonable effect for this program and the intention effect sizes for drink driving, fatigue and mobile phone use were all above this measure. Speeding intention by males was the only intention that did not produce a reasonable effect size and this is in line with other research that indicated boys have a greater affinity with speed than girls (Waylen & McKenna, 2002).

In reviewing the different effect sizes by intention it is clear that, as suggested by the TPB each intention must be considered separately. Differences between intentions are the result of different underpinning beliefs about or in relation to each intention and the context of the vignette to which participants responded.

Further Analyses based on the Theory of Planned Behavior (TPB) Results and Discussion

To further investigate how the YDDP changes the intention of participants, an analysis of the contribution of attitudes, subjective norms and perceived behavioral control to intention was conducted. Under the TPB, intention is the closest predictor of behavior and intention is underpinned by attitude, subjective norms and perceived control over the behavior (see model at end of this paper). Descriptive norms have in some instances been found to add to the prediction of intention however in this case they did not add to the accounted for variance and were dropped from the model. In accordance with the specificity required by the TPB, each intention is analysed separately, with gender differences considered.

The TPB is tested using regression to determine the amount of variance within intention (or behavior) that is explained by the underpinning variables. Often hierarchical regression is used. Stepwise regression was used for this analysis as the research was exploratory and stepwise regression allowed the statistics to produce the best model for each intention (Tabachnick & Fidel, 1996, p 156). The data was screened for normality and considered satisfactory for the purposes of the analyses. The numbers of participants in each group was smaller than that considered appropriate for regression analyses (Tabachnick & Fidel, 1996, p 132) but to amalgamate groups would have resulted in loss of important information. Results varied by intention with attitude and subjective norms accounting for the largest amounts of variance at both pre and post program. Descriptive norms did not add to the model and Perceived Behavioral Control played only a minor role. This is not surprising as the participants did not have on the road driving experience. Table 3

below shows the amounts of variance accounted for by the model for each behavioral intention.

Table 3 – Stepwise Regression Analyses by Behavioral Intention and Gender

	Female		Male	
	Pre (Adj r^2)	Post	Pre (Adj r^2)	Post
Drink driving (female n= 74; male n = 50)	43.9% (Attitude 36.3% Subjective Norm 7.6%)	58.6% (Attitude 52.4% SN 3.4% Control 2.8%)	14.6% (Attitude only)	57.1% (Attitude only)
Fatigue (female n = 32; male n = 30)	32.7% (Subjective Norm only)	42.8% (Subjective Norm only)	38.9% (Attitude only)	56.4% (Subjective Norm only)
Mobile phone use (female n = 25; male n = 20)	53.1% (Subjective Norm only)	59.5% (Attitude only)	53.4% (Subjective Norm only)	29.7% (Attitude only)
Speed (female n = 62; male n = 40)	51.2% (Attitude 42.3%; Control 4.7%; Subjective Norm 4.2%)	61.8% (Subjective Norm only)	66.9% (Attitude 59.7%; Control 7.2%)	66.2% (Attitude 62.9%; Subjective Norm 3.3%)

The accounted for variance in intention differed by gender, intention and by pre/post program. Given the brevity of the measures used in this research (a total of 16 questions), the amounts of variance accounted for are, in general, in line with other TPB research which has often used more complex measures. An interesting aspect of this research is the considerable change in variance accounted for post program compared to pre program for some behaviors, suggesting that post program there is greater predictability of intention from the TPB variables. This is assumed to be the result of increased familiarity with the behaviors (Notani, 1998). The information presented here was gathered immediately post program therefore longer effects are not known. Notably control only played a minor part in the regression analyses. These results come with a caveat because of the small numbers within each group which could have impacted on the statistical results (Tabachnick & Fidel, 1996, p 132) however combining across genders loses important information.

Overall these results suggest that young peoples' attitudes and normative beliefs about driving behavior can be changed by interventions such as the YDDP and that gender differences may require different approaches to effect change. Control appears not be important for pre drivers and could be dropped from future research in this population.

Attitude has often been found to consist of both cognitive and affective aspects and further analysis of attitude might be important to determine where the YDDP can

make a difference. Attitude is often found to make the largest contribution to intention.

Overall Discussion

The results of this research address several issues. First a well recognized theory has been applied to the evaluation of a road safety initiative and the results achieved are similar to those obtained in research that has used longer and more complex measures. The accounted for variances are within the averages reported in Sutton (1998) supporting the use and application of the theory in evaluative road safety research.

Second, the results suggest that the YDDP appears to have the potential to make a difference to the intention of pre drivers for the reduction of a variety of risky behaviors. There is concern however that females appear to gain more from the program than males. This is especially important as males are more highly represented in crashes. Gender differences in attitude towards driving have been reported in previous research with males displaying more negative attitudes than females toward driving rules and safe driving (Laapotti, Keskinen & Rajalin, 2003).

The results of the Deery and Love (1996) risky driving questionnaire require further investigation to determine if reductions in potential risk taking are evident. It must be emphasized that the behavior of participants might change once they get behind the wheel having obtained their license. Longitudinal research which investigates on the road behavior and examines differences (if any) between YYDP participants and non participants is planned. This research will investigate crash and violation histories and will provide further information about the effectiveness or otherwise of the YPPD over a longer period of time.

A weakness of the research reported here is that a control group has not been used to demonstrate that the changes in intention are a discrete function of the program. Given the nature of the program and anecdotal evidence from the trainers, it is known that participation is discussed amongst the students. As the training is conducted in small groups (9 students at a time), trainers have reported that by the time the third group from a school arrives to participate, they are already well informed about the training. An indirect effect of the program might be to raise discussion with both friends and family about driving behavior and there is some evidence of this with changes pre to post program for males with fatigue and females for speeding where the main predictor has changed from attitude to subjective norm. Discussion of driving behavior has been flagged by other research as a useful method for altering driver behavior (Clark & Powell, 1984; Gregersen, Brehmer, & Moren, 1996).

As a result of this evaluation recommendations were made to the YDDP Committee and Trainer. First, a review of the training methods should be conducted to increase the effectiveness of the program for male participants. Second, ongoing testing of attitudes/knowledge during the program should be conducted. Third, discussions of specific risky driving behavior should be integrated with the practical driving instruction (practical linked with thinking).

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179 - 211.

Brener, N. D., Collins, J. L., Kann, L., Warren, C. W., & Williams, B. I. (1995). Reliability of the Youth Risk Behavior Survey Questionnaire. *American Journal of Epidemiology, 141*(6), 575 - 580.

Clark, A. W., & Powell, R. J. (1984). Changing drivers' attitudes through peer group decision. *Human Relations, 37*(2), 155 - 162.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155 - 159.

Deery, H. A., & Love, A. W. (1996). The Driving Expectancy Questionnaire: Development, Psychometric Assessment and Predictive Utility among young Drink-Drivers. *Journal of Studies on Alcohol, 57*(2), 193 - 202.

Ferguson, C.A. (2004). *Evaluation of the Youth Driver Development Program 2003.* Unpublished Report to the Steering Committee of the Youth Driver Development Program, Bunbury, Western Australia.

Flisher, A. J., Evans, J., Muller, M., & Lombard, C. (2004). Brief Report: Test-retest reliability of self-reported adolescent risk behavior. *Journal of Adolescence, 27*, 207 - 212.

Gregersen, N. P., Brehmer, B., & Moren, B. (1996). Road safety improvement in large companies. An experimental comparison of different measures. *Accident Analysis and Prevention, 28*(3), 297 - 306.

Grimmer, K., Williams, J., & Pitt, M. (2000). Reliability of adolescents' self report of recent recreational injury. *Journal of Adolescent Health, 27*, 273 - 275.

Hauer, E. (2004). The harm done by tests of significance. *Accident Analysis and Prevention, 36, 495 – 500.*

Katila, A., Keskinen, E., Hatakka, M. & Laapotti, S. (2004). Does increased confidence among novice drivers imply a decrease in safety? The effects of skid training on slippery road accidents. *Accident Analysis and Prevention, 36, (4), 543 – 550.*

Lajunen, T., & Summala, H. (2003). Can we trust self-reports of driving? Effects of impression management on driver behavior questionniare responses. *Transportation Research Part F: Psychology and Behavior, 6*, 97 - 107.

Laapotti, S., Keskinen, E., & Rajalin, S. (2003). Comparison of young male and female drivers' attitude and self reported traffic behavior in Finland in 1978 and 2001. *Journal of Safety Research, 34*, 579 - 587.

Lawton, R., Parker, D., Stradling, S. G., & Manstead, A. S. R. (1997). Self-reported attitude towards speeding and its possible consequences in five different road contexts. *Journal of Community & Applied Social Psychology, 7*, 153 - 165.

Lund, A. K., & Williams, A. F. (1985). A review of the literature evaluating the defensive driving course. *Accident Analysis and Prevention, 17*(6), 449 - 460.

Mayhew, D. R., Simpson, H. M., Williams, A. F., & Ferguson, S. A. (1996). Effectiveness and Role of Driver Education and Training in a Graduated Licensing System. *Journal of Public Health Policy, 19*(1), 51 - 67.

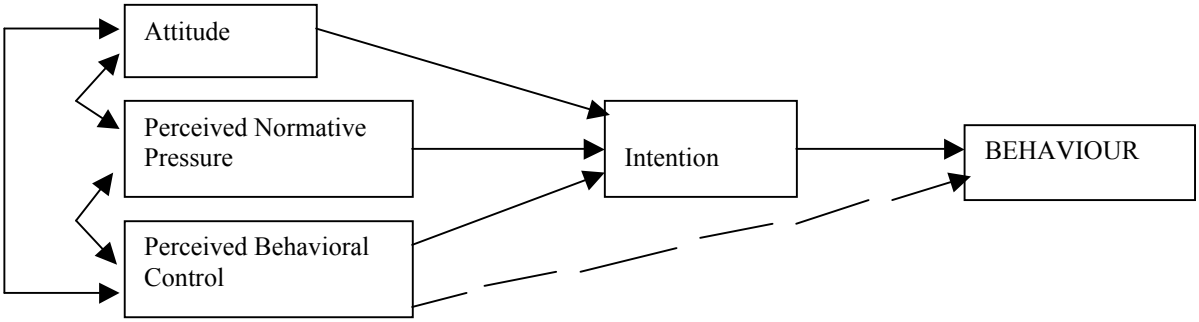
Parker, D., Manstead, A. S. R., & Stradling, S. G. (1995). Extending the Theory of Planned Behavior: the role of personal norm. *British Journal of Social Psychology, 34*, 127 - 137.

Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology, 28*(15), 1317 - 1338.

Tabachnick, B.G. & Fidel, L. (1996). Using Multivariate Statistics. New York: Harper Collins College Publishers.

Waylen, A. & McKenna, (2002). Attitudes to driving in pre-17 year olds. Behavior Research in Road Safety: 12th Seminar.

Model for Theory of Planned Behaviour (Ajzen, 1991, p. 182)



Vignette - Drink Driving	It is 1a.m. David/Dawn has been at a party out of town. He/she has had a few alcoholic drinks but feels OK and wants to get home as he/she is working the following morning. David/Dawn decides to drive.
Vignette - Driving Fatigued	David/Dawn has been studying all night for an important exam. He/she decides to drive to school despite feeling quite tired.
Vignette - Mobile Phone Use	David/Dawn is driving to school. His/her mobile phone rings. He/she is expecting it to be his/her best friend with some gossip and he/she decides to answer the phone and talk to the friend.
Vignette - Speed	It is 8.35a.m. and David/Dawn is driving to his/her work (school). He/she is late and decides to exceed the speed limit.

Questionnaires used in this research are available from the author email caferguson@bigpond.com