A COMPREHENSIVE INVESTIGATION OF THE RISKY DRIVING BEHAVIOUR OF YOUNG NOVICE DRIVERS

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Key words

Young drivers, novice, Learner, Provisional licence, graduated driver licensing, logbook, risky behaviour, pre-licence driving, depression, anxiety, sensation seeking, reward sensitivity, punishment sensitivity, reciprocal determinism, parents, peers, police, social learning theory, prototype/willingness model.

Abstract

Young novice drivers – that is, drivers aged 16-25 years who are relatively inexperienced in driving on the road and have a novice (Learner, Provisional) driver's licence – have been overrepresented in car crash, injury and fatality statistics around the world for decades. There are numerous persistent characteristics evident in young novice driver crashes, fatalities and offences, including variables relating to the young driver themselves, broader social influences which include their passengers, the car they drive, and when and how they drive, and their risky driving behaviour in particular. Moreover, there are a range of psychosocial factors influencing the behaviour of young novice drivers, including the social influences of parents and peers, and person-related factors such as age-related factors, attitudes, and sensation seeking.

Historically, a range of approaches have been developed to manage the risky driving behaviour of young novice drivers. Traditional measures predominantly relying upon education have had limited success in regulating the risky driving behaviour of the young novice driver. In contrast, interventions such as graduated driver licensing (GDL) which acknowledges young novice drivers' limitations – principally pertaining to their chronological and developmental age, and their driving inexperience – have shown to be effective in ameliorating this pervasive public health problem. In practice, GDL is a risk management tool that is designed to reduce driving at risky times (e.g., at night) or in risky driving conditions (e.g., with passengers), while still enabling novice drivers to obtain experience. In this regard, the GDL program in Queensland, Australia, was considerably enhanced in July 2007, and major additions to the program include mandated Learner practice of 100 hours recorded in a logbook, and passenger limits during night driving in the Provisional phase. Road safety researchers have also continued to consider the influential role played by the young driver's psychosocial characteristics, including psychological traits and states. In addition, whilst the majority of road safety user research is epidemiological in nature, contemporary road safety research is increasingly applying psychological and criminological theories. Importantly, such theories not only can guide young novice driver research, they can also inform the development and evaluation of countermeasures targeting their risky driving behaviour. The research is thus designed to explore the self-reported behaviours –

and the personal, psychosocial, and structural influences upon the behaviours – of young novice drivers

This thesis incorporates three stages of predominantly quantitative research to undertake a comprehensive investigation of the risky driving behaviour of young novices. Risky driving behaviour increases the likelihood of the young novice driver being involved in a crash which may harm themselves or other road users, and deliberate risky driving such as driving in excess of the posted speed limits is the focus of the program of research. The extant literature examining the nature of the risky behaviour of the young novice driver – and the contributing factors for this behaviour – while comprehensive, has not led to the development of a reliable instrument designed specifically to measure the risky behaviour of the young novice driver. Therefore the development and application of such a tool (the Behaviour of Young Novice Drivers Scale, or BYNDS) was foremost in the program of research. In addition to describing the driving behaviours of the young novice, a central theme of this program of research was identifying, describing, and quantifying personal, behavioural, and environmental influences upon young novice driver risky behaviour. Accordingly the 11 papers developed from the three stages of research which comprise this thesis are framed within Bandura's reciprocal determinism model which explicitly considers the reciprocal relationship between the environment, the person, and their behaviour.

Stage One comprised the foundation research and operationalised quantitative and qualitative methodologies to finalise the instrument used in Stages Two and Three. The first part of Stage One involved an online survey which was completed by 761 young novice drivers who attended tertiary education institutions across Queensland. A reliable instrument for measuring the risky driving behaviour of young novices was developed (the BYNDS) and is currently being operationalised in young novice driver research in progress at the Centre for Injury Research and Prevention in Philadelphia, USA. In addition, regression analyses revealed that psychological distress influenced risky driving behaviour, and the differential influence of depression, anxiety, sensitivity to punishments and rewards, and sensation seeking propensity were explored. Path model analyses revealed that punishment sensitivity was mediated by anxiety and depression; and the influence of depression, anxiety, reward sensitivity and sensation seeking propensity were moderated by the gender of the driver. Specifically, for males, sensation seeking

propensity, depression, and reward sensitivity were predictive of self-reported risky driving, whilst for females anxiety was also influential. In the second part of Stage One, 21 young novice drivers participated in individual and small group interviews. The normative influences of parents, peers, and the Police were explicated. Content analysis supported four themes of influence through punishments, rewards, and the behaviours and attitudes of parents and friends. The Police were also influential upon the risky driving behaviour of young novices. The findings of both parts of Stage One informed the research of Stage Two.

Stage Two was a comprehensive investigation of the pre-Licence and Learner experiences, attitudes, and behaviours, of young novice drivers. In this stage, 1170 young novice drivers from across Queensland completed an online or paper survey exploring their experiences, behaviours and attitudes as a pre- and Learner driver. The majority of novices did not drive before they were licensed (pre-Licence driving) or as an unsupervised Learner, submitted accurate logbooks, intended to follow the road rules as a Provisional driver, and reported practicing predominantly at the end of the Learner period. The experience of Learners in the enhanced-GDL program were also examined and compared to those of Learner drivers who progressed through the former-GDL program (data collected previously by Bates, Watson, & King, 2009a). Importantly, current-GDL Learners reported significantly more driving practice and a longer Learner period, less difficulty obtaining practice, and less offence detection and crash involvement than Learners in the former-GDL program. The findings of Stage Two informed the research of Stage Three.

Stage Three was a comprehensive exploration of the driving experiences, attitudes and behaviours of young novice drivers during their first six months of Provisional 1 licensure. In this stage, 390 of the 1170 young novice drivers from Stage Two completed another survey, and data collected during Stages Two and Three allowed a longitudinal investigation of self-reported risky driving behaviours, such as GDL-specific and general road rule compliance; risky behaviour such as pre-Licence driving, crash involvement and offence detection; and vehicle ownership, paying attention to Police presence, and punishment avoidance. Whilst the majority of Learner and Provisional drivers reported compliance with GDL-specific and general road rules, 33% of Learners and 50% of Provisional drivers reported speeding by 10-20 km/hr at least occasionally. Twelve percent of Learner drivers reported pre-Licence driving, and these drivers were significantly more risky as

Learner and Provisional drivers. Ten percent of males and females reported being involved in a crash, and 10% of females and 18% of males had been detected for an offence, within the first six months of independent driving. Additionally, 75% of young novice drivers reported owning their own car within six months of gaining their Provisional driver's licence. Vehicle owners reported significantly shorter Learner periods and more risky driving exposure as a Provisional driver. Paying attention to Police presence on the roads appeared normative for young novice drivers: 91% of Learners and 72% of Provisional drivers reported paying attention. Provisional drivers also reported they actively avoided the Police: 25% of males and 13% of females; 23% of rural drivers and 15% of urban drivers. Stage Three also allowed the refinement of the risky behaviour measurement tool (BYNDS) created in Stage One; the original reliable 44-item instrument was refined to a similarly reliable 36-item instrument.

A longitudinal exploration of the influence of anxiety, depression, sensation seeking propensity and reward sensitivity upon the risky behaviour of the Provisional driver was also undertaken using data collected in Stages Two and Three. Consistent with the research of Stage One, structural equation modeling revealed anxiety, reward sensitivity and sensation seeking propensity predicted self-reported risky driving behaviour. Again, gender was a moderator, with only reward sensitivity predicting risky driving for males. A measurement model of Akers' social learning theory (SLT) was developed containing six subscales operationalising the four constructs of differential association, imitation, personal attitudes, and differential reinforcement, and the influence of parents and peers was captured within the items in a number of these constructs. Analyses exploring the nature and extent of the psychosocial influences of personal characteristics (step 1), Akers' SLT (step 2), and elements of the prototype/willingness model (PWM) (step 3) upon self-reported speeding by the Provisional driver in a hierarchical multiple regression model found the following significant predictors: gender (male), car ownership (own car), reward sensitivity (greater sensitivity), depression (greater depression), personal attitudes (more risky attitudes), and speeding (more speeding) as a Learner.

The research findings have considerable implications for road safety researchers, policy-makers, mental health professionals and medical practitioners alike. A broad range of issues need to be considered when developing, implementing and evaluating interventions for both the intentional and unintentional risky driving

behaviours of interest. While a variety of interventions have been historically utilised, including education, enforcement, rehabilitation and incentives, caution is warranted. A multi-faceted approach to improving novice road safety is more likely to be effective, and new and existing countermeasures should capitalise on the potential of parents, peers and Police to be a positive influence upon the risky behaviour of young novice drivers. However, the efficacy of some interventions remains undetermined at this time. Notwithstanding this caveat, countermeasures such as augmenting and strengthening Queensland's GDL program and targeting parents and adolescents particularly warrant further attention.

The findings of the research program suggest that Queensland's current-GDL can be strengthened by increasing compliance of young novice drivers with existing conditions and restrictions. The rates of speeding reported by the young Learner driver are particularly alarming for a number of reasons. The Learner is inexperienced in driving, and travelling in excess of speed limits places them at greater risk as they are also inexperienced in detecting and responding appropriately to driving hazards. In addition, the Learner period should provide the foundation for a safe lifetime driving career, enabling the development and reinforcement of non-risky driving habits. Learners who sped reported speeding by greater margins, and at greater frequencies, when they were able to drive independently.

Other strategies could also be considered to enhance Queensland's GDL program, addressing both the pre-Licence adolescent and their parents. Options that warrant further investigation to determine their likely effectiveness include screening and treatment of novice drivers by mental health professionals and/or medical practitioners; and general social skills training. Considering the self-reported pre-licence driving of the young novice driver, targeted education of parents may need to occur *before* their child obtains a Learner licence. It is noteworthy that those participants who reported risky driving during the Learner phase also were more likely to report risky driving behaviour during the Provisional phase; therefore it appears vital that the development of safe driving habits is encouraged from the beginning of the novice period.

General education of parents and young novice drivers should inform them of the considerably-increased likelihood of risky driving behaviour, crashes and offences associated with having unlimited access to a vehicle in the early stages of intermediate licensure. Importantly, parents frequently purchase the car that is used

by the Provisional driver, who typically lives at home with their parents, and therefore parents are ideally positioned to monitor the journeys of their young novice driver during this early stage of independent driving. Parents are pivotal in the development of their driving child: they are models who are imitated and are sources of attitudes, expectancies, rewards and punishments; and they provide the most driving instruction for the Learner. High rates of self-reported speeding by Learners suggests that GDL programs specifically consider the nature of supervision during the Learner period, encouraging supervisors to be vigilant to compliance with general and GDL-specific road rules, and especially driving in excess of speed limit.

Attitudes towards driving are formed before the adolescent reaches the age when they can be legally licensed. Young novice drivers with risky personal attitudes towards driving reported more risky driving behaviour, suggesting that countermeasures should target such attitudes and that such interventions might be implemented *before* the adolescent is licensed. The risky behaviours and attitudes of friends were also found to be influential, and given that young novice drivers tend to carry their friends as their passengers, a group intervention such as provided in a school class context may prove more effective. Social skills interventions that encourage the novice to resist the negative influences of their friends and their peer passengers, and to not imitate the risky driving behaviour of their friends, may also be effective. The punishments and rewards anticipated from and administered by friends were also found to influence the self-reported risky behaviour of the young novice driver; therefore young persons could be encouraged to sanction the risky, and to reward the non-risky, driving of their novice friends.

Adolescent health programs and related initiatives need to more specifically consider the risks associated with driving. Young novice drivers are also adolescents, a developmental period associated with depression and anxiety. Depression, anxiety, and sensation seeking propensity were found to be predictive of risky driving; therefore interventions targeting psychological distress, whilst discouraging the expression of sensation seeking propensity whilst driving, warrant development and trialing. In addition, given that reward sensitivity was also predictive, a scheme which rewards novice drivers for safe driving behaviour – rather than rewarding the novice through emotional and instrumental rewards for risky driving behaviour – requires further investigation.

The Police were also influential in the risky driving behaviour of young novices. Young novice drivers who had been detected for an offence, and then avoided punishment, reacted differentially, with some drivers appearing to become less risky after the encounter, whilst for others their risky behaviour appeared to be reinforced and therefore was more likely to be performed again. Such drivers saw themselves as 'smarter drivers', reporting they also actively avoided Police presence on the road. Further investigation is required to make the most of the positive influence of the Police whilst minimising the negative influence that may result from punishment avoidance.

The persistent gender differences in behaviours, attitudes, psychosocial characteristics and predictors of risky behaviours found throughout the program of research, consistent with findings in the extant literature, suggests that gender-specific interventions merit further consideration. To date, licensing programs such as Queensland's GDL treat all young novice drivers as a homogeneous group, regulating the driving conditions and proscribing the driving circumstances for all novice drivers irrespective of gender. Other countermeasures such as resilience and social skills training could augment Queensland's GDL, and these similarly may need to consider gender differences, particularly as gender differences in the perceived negative outcomes of risky driving were also found in the research program. To illustrate, females reported that the prospect of incurring physical harm to themselves, or injuring another person, curtailed their risky driving behaviour; whilst males reported that the potential financial costs for themselves, such as having to replace their vehicle, reduced their risky driving behaviour.

In addition to the extensive practical implications arising from the comprehensive program of research, a number of methodological and theoretical implications arose from the research. A self-report measure of risky driving behaviour specifically designed for the young novice driver was developed, and a measurement model for Akers' SLT was developed and tested and the relationships amongst SLT constructs and their influence on self-reported risky driving behaviour were examined. Akers' SLT and Gerrard and Gibbons' PWM were applied in the longitudinal and cross-sectional research guided by a framework which considers the reciprocal relationship amongst personal, environmental and behavioural factors. All three factors were associated with the risky driving behaviour of young novices, and further research, countermeasure development and evaluation should consider the

interactive relationships amongst the young novice driver themselves, their environment, and the on-road driving behaviours that they engage in.

List of publications and submitted manuscripts comprising this Thesis

Paper 1: Scott-Parker, B., Watson, B., & King, M. J. (2010). The risky behaviour of young drivers: Developing a measurement tool. In *Proceedings of the 20th Canadian Multidisciplinary Road Safety Conference, Niagara Falls, Ontario, June 6-9 2010.*
Paper 2: Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2011). The psychological distress of the young driver: A brief report. *Injury Prevention, 17,* 275-277. doi: 10.1136/ip.2010.031328
Paper 3: Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). The influence of sensitivity to reward and punishment, propensity for sensation seeking, depression, and anxiety on the risky behaviour of novice drivers: A path model. *British Journal of Psychology, 103*(2), 248-267. doi: 10.1111/j.2044-8295.2011.02069.x
Paper 4: Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). "They're lunatics on the road": Exploring the normative influences of parents, friends, and police on young novices' risky driving decisions. *Safety Science, 50*(9), 1917-1928. doi: 10.1016/j.ssci.2012.05.014
Paper 5: Scott-Parker, B., Bates, L., Watson, B., King, M. J., & Hyde, M. K. (2011). The impact of changes to the graduated driver licensing program in Queensland, Australia on the experiences of Learner drivers. *Accident Analysis and Prevention, 43,* 1301-1308. doi: 10.1016/j.aap.2011.01.012
Paper 6: Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (in press). Young, inexperienced and on the road – Do novice drivers comply with road rules? *Transportation Research Record: Journal of the Transportation Research Board.*
Paper 7: Scott-Parker, B., Bates, L., Watson, B., King, M. J., & Hyde, M. K. (2011). Young and unlicensed: Risky driving before entering the licensing system. *Traffic Injury Prevention, 13*(3), 213-218. doi*:* 10.1080/15389588.2011.638683
Paper 8: Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2011). Mileage, car ownership, experience of punishment avoidance and the risky driving of young drivers. *Traffic Injury Prevention, 12*(6), 559-567. doi: 10.1080/15389588.2011.621000
Paper 9: Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). A further exploration of sensation seeking propensity, reward sensitivity, depression, anxiety and the risky behaviour of young novice drivers in a structural equation model.

Accident Analysis and Prevention. doi:10.1016/j.aap.2012.05.027
Paper 10: Scott-Parker, B., Hyde, M. K., Watson, B., & King, M. J. (2012). Speeding by young novice drivers: What can personal characteristics, psychosocial theory, and prior behaviour add to our understanding? *Accident Analysis and Prevention.* doi: 10.1016/j.aap.2012.04.010
Paper 11: Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). Confirmatory factor analysis of the Behaviour of Young Novice Drivers Scale (BYNDS). *Accident Analysis and Prevention, 49,* 385-391. doi: 10.1016/j.aap.2012. 02.021

Note. This Table details publications that were produced during the PhD candidature only and that comprise the thesis-by-publication.

The following publications were also produced during the PhD candidature; however they are not incorporated within the thesis-by-publication.

Freeman, J., Scott-Parker, B., Wong, I., & Haworth, N. (2012). Vulnerable road user groups: A review of younger drivers, motorcyclists and older drivers. *Vulnerable Groups and Inclusion, 3*. doi: 10.3402/vgi.v3i0.14889.

Scott-Parker, B., & Watson, B. (2011). *Submission on "South Australia's graduated licensing scheme: Initiatives to protect young drivers" Discussion Paper.*

In addition, the following publications cited within the thesis-by-publication are based on the candidate's Honours thesis, and were not produced as part of the PhD program of research.

Scott-Parker, B., Watson, B., & King, M. J. (2009a). Understanding the psychosocial factors influencing the risky behaviour of young drivers. *Transportation Research Part F, 12*, 470-482. doi: 10.1016/j.trf2009.08.003

Scott-Parker, B., Watson, B., King, M. J. (2009b). Exploring how parents and peers influence the behaviour of young drivers. *2009 Australasian Road Safety Research, Policing and Education Conference*, 10-12 November, Sydney, New South Wales, Australia.

Conference papers, presentations, and posters related to this thesis

Australasian College of Road Safety, Queensland Chapter, December 2009, Brisbane, Queensland. *Exploring how Parents and Peers Influence the Behaviour of Young Drivers*. (Presentation)
Institute of Health and Biomedical Innovation Annual Conference, Queensland University of Technology, December 2009, Brisbane, Queensland. *Exploring the Influence of Parents and Peers on the Risky Behaviour of Young Novice Drivers.* (Poster)
Canadian Association of Road Safety Professionals, 20th Canadian Multidisciplinary Road Safety Conference, June 2010, Niagara Falls, Canada. *The Risky Behaviour of Young Novice Drivers: Developing a Measurement Tool.* (Peer-Reviewed Paper Presentation)
International Congress of Applied Psychology 2010, July 2009, Melbourne, Victoria. *The Psychological Distress of the Young Novice Driver.* (Non-Peer Reviewed Paper Presentation)
Queensland Injury Prevention Council, Evidence to Action Symposium, November 2010, Townsville, Queensland. *Driving and Licensing Experiences of Learner Drivers in Queensland: Comparing the Experiences of Learner Drivers Before and After the July 2007 Enhancement of the Graduated Driver Licensing Program.* (Presentation)
Institute of Health and Biomedical Innovation Annual Conference, Queensland University of Technology, December 2010, Gold Coast, Queensland. *The Risky Behaviour of Young Novice Drivers: Developing a Measurement Tool.* (Presentation)
The Transportation Research Board Annual Conference Human Factors Workshop, Innovations in Graduated Driver Licensing: Heading in the Right Direction, January 2011, Washington DC, United States. *Comparison of Learner Permit Experiences in Two Australian States with Different GDL Requirements.* (Presentation by Prof Barry Watson)
The Spinal Injuries Association of Queensland, February 2011, Brisbane, Queensland. *The Young Driver.* (Presentation)

2011 Directions in Road Safety Research, April 2011, Adelaide, South Australia. *Young novice drivers and an enhanced graduated driver licensing program.* (Presentation).
Department of General Practice, University of Melbourne, August 2011, Melbourne, Victoria. *Car Ownership and the Risky Behaviour of Young Novice Drivers.* (Invited Presentation)
Australasian College of Road Safety, Annual Conference, September 2011, Melbourne, Victoria. *Car Ownership and the Risky Behaviour of Young Novice Drivers.* (Non-Peer Paper Reviewed Presentation)
Australian Injury Prevention Network, 10th National Conference on Injury Prevention and Safety Promotion, November 2011, Brisbane, Queensland. *Young and unlicensed: Risky driving before entering the licensing system.* (Non-Peer Reviewed Presentation)
The Transportation Research Board Annual Conference, *Young, inexperienced and on the road – do novice drivers comply with road rules?* January 2012, Washington DC, United States. (Peer Reviewed Poster)
The Transportation Research Board Annual Conference Human Factors Workshop, At what age should teenagers begin to drive? The research evidence, January 2012, Washington DC, United States. *The Queensland experience with graduated driver licensing and longer minimum Learner periods. Does it differ for younger and older novices?* (Presentation)
Australasian College of Road Safety, Queensland Chapter, March 2012, Brisbane, Queensland. *Younger and Older Drivers: What Contributes to their Increased Risk?* (Invited Joint Presentation with Dr Mark King)
New South Wales Young Drivers Safety Driving Course Board, May 2012, Sydney, New South Wales. *Psychological and social factors influencing young novice driver behaviour: Implications for a Safety Drivers Course.* (Presentation by Prof Barry Watson, co-author Mr Pete Rowden)
2012 Directions in Road Safety Research, June 2012, Brisbane, Queensland. *A comprehensive investigation of the risky driving behaviour of young novice drivers.* (Presentation)
Queensland University of Technology Open Day, August 2012, Kelvin Grove, Queensland, Australia. *Young drivers – tips for parents*. (Presentation)

Commonwealth Parliament Road Safety Forum, August 2012, Canberra, Australia. *The impact of an enhanced graduated driver licensing program in Queensland*. (Presentation)
Australasian College of Road Safety, September 2012, Melbourne, Australia. *The impact of an enhanced graduated driver licensing program in Queensland*. (Presentation)
5th International Conference on Traffic and Transport Psychology, August 2012, Groningen, The Netherlands. *The experiences of novices in an enhanced graduated driver licensing program in Queensland, Australia.* (Presentation)

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List of abbreviations

Abbreviation/ Symbol	Definition
α	Cronbach's alpha
Adj R^2	Adjusted squared multiple correlation
B	Unstandardised beta weight
β	Standardised beta weight
ΔR^2	Change in squared multiple correlation
F	F-statistic
M	Mean
N, n	Sample size
p	Probability level
R^2	Squared multiple correlation
SD	Standard deviation
sr^2	Unique variance (squared part correlation)
χ^2	Pearson's chi-square statistic
AMOS	Analysis of Moment Structures
ANX	Anxiety
ARIA	Accessibility/Remoteness Index of Australia
BSSS	Brief Sensation Seeking Scale
BYNDS	Behaviour of Young Novice Drivers Scale
c.f.	Compared with
CFA	Confirmatory factor analysis
CFI	Bentler's Comparative Fit Index
DEP	Depression
DBQ	Driver Behaviour Questionnaire
e.g.	For example
GDL	Graduated driver licensing
GFI	Joreskog-Sorbom Goodness of Fit Index
HMR	Hierarchical multiple regression
ISSS	Impulsive Sensation Seeking Scale
K10	Kessler's Psychological Distress Scale

Abbreviation/ Symbol	Definition
km/hr	Kilometres per hour
Kurt	Kurtosis
P1	Provisional 1 licence
P2	Provisional 2 licence
PASW	Predictive Analysis SoftWare
PDA	Practical driving assessment
PLD	Pre-licence driving
PPSS	Personal propensity for sensation seeking/ sensation seeking Propensity
PWM	Prototype/Willingness Model
RMSEA	Steiger-Lind Root Mean Square Error of Approximation
SEM	Structural equation modeling
Skew	Skewness
SLT	Social Learning Theory
SP	Sensitivity to punishment/ punishment sensitivity
SPQ	Sensitivity to Punishment Questionnaire
SPSRQ	Sensitivity to Punishment and Sensitivity to Reward Questionnaire
SPSS	Statistical Package for the Social Sciences
SR	Sensitivity to reward/ reward sensitivity
SRQ	Sensitivity to Reward Questionnaire
TPB	Theory of Planned Behavior
TLI	Tucker-Lewis Index

Glossary of terms and acronyms

Driver education

Driver education focuses upon teaching safe driving behaviour by increasing the knowledge of safe road use and compliance with road rules to pre-Licence and novice drivers. The role of personal attitudes and values can be considered in education programs. Education is typically undertaken in a classroom environment, and can include driver training (Christie, 2001).

Driver training

Driver training focuses upon teaching young novice drivers techniques to control their vehicle, and may include on-road and off-road components. Skills taught can range from basic vehicle operation and handling techniques to advanced techniques such as skid control (Christie, 2001).

Driving supervision

In the enhanced-GDL program in Queensland, novices with a Learner licence must be accompanied by a driving supervisor who has held an unrestricted driver's licence for at least one year (Queensland Transport, 2007c). Supervisors are encouraged not only to instruct in safe vehicle and road use and monitor compliance with GDL-specific and general road rules, they can also advise the Learner regarding influences upon their driving behaviour, such as passengers,

Enhanced-GDL program

The GDL program in place in Queensland after 1 July 2007.

Fatality

To be classified as a road fatality in Australia, the crash must occur "on a public road, is unintentional and the death occurred within 30 days from injuries sustained in the crash" (ATSB, 2004a). This definition becomes problematic when considering international young driver fatality statistics, as the parameters for defining a fatality vary widely around the world. To illustrate, criteria range from dying at the crash site, to dying after the crash, irrespective of the time elapsed, are used across countries (WHO, 2009).

Former-GDL program

The GDL program in place in Queensland prior to 1 July 2007.

Graduated driver licensing (GDL)

Graduated driver licensing refers to a system of licensing for novice drivers which traditionally has at least three levels of driving privileges and restrictions, commencing with a Learner phase requiring supervision, followed by an intermediate phase, and concluding with an unrestricted phase (Foss, 2007). To illustrate in the Queensland context, the GDL program which was considerably enhanced in July 2007 requires novice drivers progress through three licensing stages (Learner, Provisional 1, Provisional 2), and three assessments of their ability (Learner Theory Test, Q-Safe Practical Driving Assessment, Hazard Perception Test) with various restrictions (e.g., mobile use, passengers) and time constraints (e.g., 12 month minimum period of Learner licence) (Queensland Transport, 2007a, b, 2008b).

Learner driver

A driver with a valid Learner driver's licence.

Novice driver

A novice driver who has a Learner, Provisional 1 (P1) or Provisional 2 (P2) driver's licence and therefore they are 'new' to the driving experience.

Older drivers

Whilst typically the term 'older' drivers refers to mature drivers (such as those aged 60 years and older, DTMR, 2012), in the context of the research program older drivers refers to any drivers aged older than 25 years.

P1 driver

A driver with a valid Provisional 1 driver's licence. In Queensland, Australia, this licence applies to the first 12 months of independent driving.

P2 driver

A driver with a valid Provisional 2 driver's licence. In Queensland, Australia, this

licence applies to months 13-36 of independent driving.

Pre-Licence driving

Driving on the road prior to obtaining a valid Learner driver's licence.

Provisional driver

A driver with a valid Provisional (intermediate) driver's licence (P1 or P2).

Psychological distress

The experience of the symptoms of anxiety and/or depression by the young novice driver. In the program of research, it was measured using Kessler's K10 Psychological Distress Scale (Kessler et al., 2002).

Risky driving behaviour

Risky driving behaviour constitutes any risky driving undertaken by the young novice driver which increases the likelihood of the young novice driver being involved in a car crash and may harm or fatally injure the young novice driver themselves, their passenger(s), and other road users such as pedestrians, cyclists, drivers and passengers in other vehicles. This definition includes risky driving behaviour which the young novice driver may perform with or without being aware of the increased risks, such as travelling at the posted speed limit during heavy rain. In other words, it encompasses both intentional and unintential behaviours that increase crash risk.

Young driver

The term 'young driver' is inextricably linked with novice driver licensing. The definition of a 'young driver' varies widely, both within Australia and around the world, but it typically relates to the period from the minimum age at which a Learner licence can be obtained to age 25 years which is usually a number of years post unrestricted-licensure. For example, Victoria defines a young driver as "motorists aged 18 to 25 years" (www.arrivealive.vic.gov.au), while the Australian Transport Safety Bureau categorises road deaths and injuries by the ages of 0-16, 17-20, and 21-25 years (ATSB, 2008). In Queensland however young people can obtain a

learner permit to start driving at the age of 16 years; therefore for the purposes of the program of research, *young drivers* shall be defined as motorists aged 16 to 25 years.

Young novice driver

For the purposes of the program of research, the definition of a 'young novice driver' is a young driver (a driver aged 16 to 25 years) who is also a novice driver (has a valid and current Learner, P1 or P2 driver's licence).

Statement of original authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: ……..

Date: ……..

Acknowledgements

"When you reach the end of your rope, tie a knot in it and hang on."

Anyone who has undertaken the mammoth task of a PhD research program, and produced a thesis (whom I have named 'Eduardo'), will know it can and frequently does push you to the end of your rope. While I apparently have a never-give-in gene which means that I have to 'hang on', and many people have played an important role in my journey over the last three and a half years, three important groups of people have helped me 'tie a knot' in the first place.

Firstly, thank you to the thousands of young novice drivers who shared an important part of your lives with me. You are just beginning your lives, and if I can help keep you safe, then all of my work, sleep deprivation, and grey hair is worth it. A special thank you goes to those young drivers who shared with me during one of the worst summers in our state's history.

Secondly, thank you to my supervisory team. Mel, you were a source of analytical and theoretical support before joining the team, and most importantly you were – and continue to be – a source of inspiration. You have always believed in me and you always knew what to say when I was running out of rope. Mark, you constantly crack me up with the quirky things you say and the different perspectives that you take. In the storm, you are the dark knight. Barry, you have managed to keep your good cheer whilst continually wrangling with a zealous and obsessed student. This certainly has been no mean feat! You also have learnt to 'happy dance', which is also very important. I would not be where I am today without your unwavering belief in my abilities and my potential. Your unending support has meant the world to me.

And, saving the best for last, thank you to my family. To my parents-in-law Jan and Jack, thank you for babysitting your favourite puppy whilst I was away presenting at a conference. To my Mum and Dad Christine and John, thank you for repeatedly dropping everything and putting your lives on hold to babysit children, dogs, and our home whilst I travelled around Australia and the world sharing my research and learning about the research of others. Thank you also for helping me to 'divide and conquer' by babysitting during school holidays – there seem to be so many more of these today than when I was a child! Maybe I will stop accumulating

degrees now that you need to carry a list of my achievements with you…. To my precious children Imogen Paris and Brock Valentine, you are the reason I just kept hanging on. A hug does so much, and you both have learnt to make a pretty wicked cup of tea. Even though you and Daddy don't understand my obsession, you still accept and encourage me at every step. I have never been more proud than when overhearing you trying to explain to your friends exactly what your Mummy does. Finally, to my darling husband Gary, I would not be who I am today without you. I know you don't care about little details like goodness-of-fit indices, but you have been excited with me as I have reached milestones in my research, and you have shared my frustrations when things didn't go smoothly. This is exactly what I needed. Thank you doesn't begin to say it.

Chapter One: Introduction

1.1 Introductory comments

This chapter outlines the program of research comprising this thesis-by-publication. Specifically, the rationale for the research will be provided, and the research aims summarised. The demarcation of the scope of the research program will be defined. Finally, the structure of the dissertation will be described.

1.2 Rationale for the research

1.2.1 The persistent overrepresentation of young novice drivers in road crash statistics

Young novice drivers – that is drivers aged 16-25 years who are relatively inexperienced in driving on the road and have a novice driver's licence (i.e., Learner or Provisional licence) or – constitute a major public health concern in terms of their numbers of crashes, their rates of crash involvement, and the injuries and fatalities arising from those crashes. The overrepresentation of young novice drivers in car crashes is a persistent global road safety problem (Doherty, Andrey, & MacGregor, 1998; European Transport Safety Council (ETSC), 2011) recognised more than half a century ago (Chliaoutakis, Darviri, & Demakakos, 1999). Car crashes are the leading cause of death for persons aged 15-24 years in Organisation for Economic Co-operation and Development (OECD) countries, constituting 10% of the population in 2004 but contributing 27% of all crash fatalities (OECD, 2006). In Australia in 2009, 17-25 year olds comprised 12% of Australia's population, but represented 24% of all driver fatalities (Department of Infrastructure, Transport, Regional Development and Local Government (DITRDLG), 2010). In Queensland in 2010, 23% of all persons fatally injured in car crashes were aged 17-24 years (Department of Transport and Main Roads (DTMR), 2011a). Moreover, 26% of persons of all ages killed on Queensland roads in the 12 months to July 2011 were fatally injured in a crash involving a driver aged 17-24 years (DTMR, 2011b).

Whilst fatalities are a cause for great concern, the overrepresentation of young novice drivers in non-fatal injury statistics should also be considered (Hurst, 2009). Thirty-six percent of all hospitalised casualties across the state involved a driver aged 17-24 years (DTMR, 2011b). Young persons also are at high risk of dying as passengers, with young passengers representing two out of every seven passengers killed in Australia in 2007 (DITRDLG, 2008). Sixty percent of fatalities and 45% of hospitalised casualties for crashes involving young drivers in

Queensland during the year ending 30 June 2009 were for the young driver themselves; and 22% of fatalities and 20% of hospitalisations comprised their passengers. In 81% of fatalities and 72% of hospitalisations for crashes involving young drivers between 1 July 2004 and 30 June 2009, the young driver was considered to be at fault in the crash (DTMR, 2011c).

As shown in Figure 1.1, whilst the rate of all persons killed on Australian roads per 100 000 population has continued to decrease during the last decade and a half, young driver fatalities have remained considerably higher than the general driving population (DITRDLG, 2010). This pattern is also evident in other motorised jurisdictions (e.g., United States, Sivak & Schoettle, 2011). Therefore it is vital that road safety researchers continue in their efforts to understand the nature of and the influences upon the driving behaviours of the young novice.

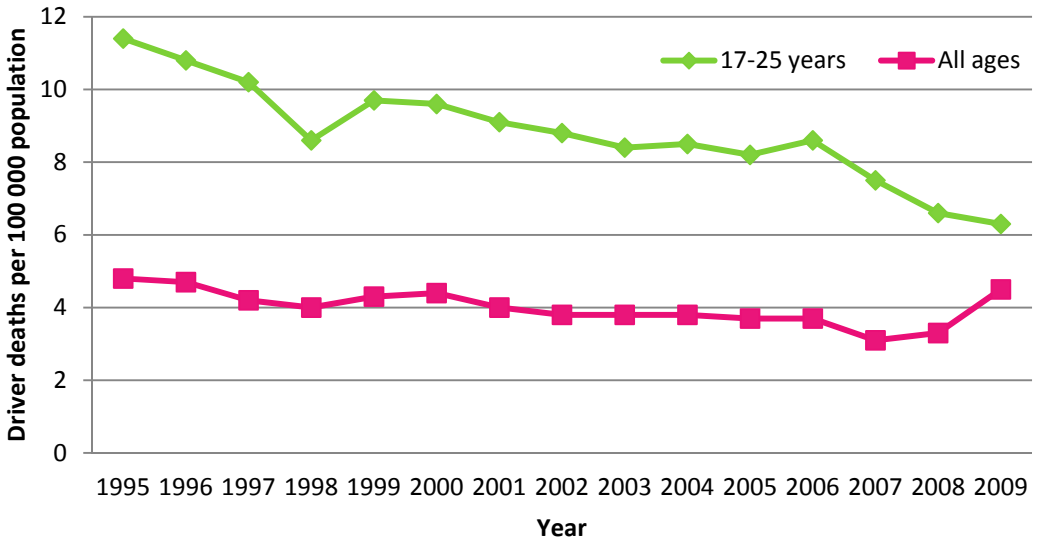


Figure 1.1 Deaths per 100 000 population by age group for drivers – Australia 1995 to 2009

Adapted from "Road Deaths Australia, 2009 Statistical Summary", by Department of Infrastructure, Transport, Regional Development and Local Government, 2010, p. 25.

1.2.2 Risky driving behaviour

Whilst factors influencing the driver environment contribute to crashes, including inadequate lighting and slippery road surfaces due to precipitation, and vehicle defects such as brake failure and worn tyres (Sobey & Taylor, 1980, cited in Norris, Matthews, & Riad, 2000), the majority of young novice driver crashes arise

from voluntary risky driver behaviour (Reimer et al., 2005) which may include intentional risky driving such as exceeding speed limits (Catchpole, Macdonald, & Bowland, 1994; Ivers et al., 2009) and unintentional risky driving such as driving too fast for the conditions. In addition, higher risk acceptance increases the risk of serious injury from a car crash by eight times (Turner & McClure, 2004).

To illustrate, driver error, such as distraction and speeding, was the most common contributor to young novice driver crashes in the United States between July 2005 and December 2007, and the young novice driver was at fault in 80% of these crashes (Curry, Hafetz, Kallan, Winston, & Durbin, 2011). Other research has demonstrated that a one degree increment in the risky driving behaviour score which consisted of such behaviours as driving without a seatbelt and drink driving increased the risk of car crash by 35% among Greek and Italian university students (Antonopoulos et al., 2011). Risky driving behaviours also predicted the injury rates of young male drivers (Jelalian, Alday, Spirito, Rasile, & Nobile, 2000), and engagement in risky behaviours such as speeding consistently corresponds to greater crash involvement (Palk, Freeman, Gee Kee, Steinhardt, & Davey, 2011; Clarke, Ward, & Truman, 2005). It is also notable that young novice drivers who crash or offend are significantly more likely to again crash or offend (e.g., Chandraratna, Stamatiadis, & Stromberg, 2005; Malchose & Vachal, 2011).

1.2.2.1 Definition of risky driving behaviour

Risky driving behaviour constitutes any risky driving undertaken by the young novice driver which increases the likelihood of the young novice driver being involved in a car crash and may harm or fatally injure the young novice driver themselves, their passenger(s), and other road users such as pedestrians, cyclists, drivers and passengers in other vehicles. This definition includes risky driving behaviour which the young novice driver may perform with or without being aware of the increased risks, such as travelling at the posted speed limit during heavy rain. In other words, it encompasses both intentional and unintential behaviours that increase crash risk. Of particular concern to the program of research is intentional or *intentional* risky driving behaviour, such as driving in excess of posted speed limits or after drinking alcohol. Such deliberate risky driving behaviours are also illegal and punishable by such sanctions as monetary fines, demerit points, licence suspension, vehicle confiscation, and imprisonment. It is noteworthy, however, that

many intentionally risky driving behaviours are not detected by traffic enforcement authorities and devices, such as the Police and mobile and fixed speed camera devices. In consideration of their illegal nature, and the substantially-increased likelihood of harm to the young novice driver and other road users alike, intentional risky driving behaviours are the primary focus of the program of research. A comprehensive understanding of the risky driving behaviour of young novices is fundamental if effective countermeasures are to be developed and implemented.

1.2.3 Historical approaches to managing risky driving behaviour

Historically, a range of approaches have been developed not only in Queensland and Australia, but around the world, to manage the risky driving behaviour of young novice drivers. These countermeasures include driver training and education, media campaigns, legislation and enforcement, and remediation and retraining programs. However, the evidence regarding the effectiveness of these approaches is mixed. (Section 2.4 will discuss these approaches in greater detail). In contrast, there is promising evidence regarding the effectiveness of graduated driver licensing (GDL) which has been introduced in a number of jurisdictions, including Australia, New Zealand, and the United States. GDL acknowledges the young novice drivers' limitations pertaining to their developmental factors and to their driving inexperience, and acts as a form of risk management to reduce the risky driving behaviour of the young novice driver.

1.2.3.1 Graduated driver licensing

Of particular relevance to the research program, Queensland introduced an enhanced GDL program in July 2007. As will be seen in 2.4.9.1, GDL programs are a form of risk management for all novices, featuring a gradual decrease in driving restrictions and a gradual increase in driving privileges over an extended duration. Conditions such as night-driving and peer-passenger restrictions are designed to reduce driving at risky times and in risky circumstances, whilst allowing novices to gain on-road driving experience. Importantly, the research program examines the risky behaviour, attitudes and experiences of young novice drivers in the *enhanced*-GDL program as well as providing a comparison of the experiences and behaviours of the current young novice drivers with those of a sample of young novice drivers

progressing through the *former*-GDL program utilising data collected before the program changes (Bates, Watson, & King, 2009a).

1.2.4 The need for a theoretical framework

Consistent with road safety research pertaining to older and more experienced drivers, much of the young novice driver road safety research is epidemiological in design and execution. Further, risky driving behaviours are frequently considered in isolation or with little consideration of personal or psychosocial influences upon this behaviour. A theoretical framework not only can guide a comprehensive investigation of the risky driving behaviour of young novices, and the influences upon this behaviour, but can also guide the development and subsequent evaluation of young novice driver countermeasures (Shope, 2006). Thus the research program is framed within Bandura's reciprocal determinism model (1978), investigating the nature and mechanisms of influence of the person, the environment and the behaviour upon the risky driving behaviour of young novices. More specifically, Akers' social learning theory is used to guide the examination of self-reported risky driving behaviour, and elements of Gerrard and Gibbons' prototype/willingness model are used to augment the analyses.

1.3 The research aims

The main objective of the research program is to comprehensively investigate the risky driving behaviour of young novice drivers, with a focus upon intentionally risky driving behaviour. This will include consideration of the nature, mechanisms and extent of a variety of personal, environmental, social, and behavioural influences upon this risky driving. The research program will be guided by a theoretical framework to increase the likelihood of the findings informing countermeasure development and evaluation. The key aims of the research program are to:

1. more fully understand the risky driving behaviour of young novices and the nature and extent of the psychosocial influences upon this risky behaviour;
2. contribute to improved measurement of young novice driver risky behaviour;
3. examine the impact of key components of the GDL program introduced in Queensland in July 2007;
4. enhance the theoretical approach to exploring the risky driving behaviour of young novices;

5. inform the development of countermeasures targeting young novice drivers.

The five research aims are addressed via five research questions. The first three research questions are informed by the literature review of Chapter Two and are identified at the end of that chapter. The final two research questions are informed by the theoretical and methodological perspectives reviewed in Chapter Three, and are provided at the end of that chapter.

1.4 Demarcation of scope of the research program

The entire research program is based upon the self-reported experiences, attitudes, behaviours, perspectives and perceptions of the young novice driver themselves. It is noteworthy that the qualitative research also allowed insight into the mechanisms the young novice driver uses to exert influence over their friends' risky driving behaviour, either as a passenger during the journey or as a member of the peer group before and after the journey. The research also focused only upon the novice driving a *motor vehicle* (which includes but is not limited to passenger and utility vehicles and excludes all-terrain vehicles and heavy vehicles such as trucks) and not powered two- or three-wheel vehicles (which includes but is not limited to motorcycles, scooters and mopeds).

Whilst the influence of culture and popular media such as video games, movies, and car advertising upon the risky behaviour of young drivers has been recognised in the literature (e.g., Beullens, Roe, & Van den Bulck, 2008; Fischer, Greitemeyer, Kastenmuller, Vogrincic, & Sauer, 2011), including personal interest in motor racing (Tranter & Warn, 2008), such influences were beyond the scope of the research program. Further, music tempo has been found to increase risk taking behaviour by the young driver (Hall & Wiesenthal, 2011), however again this was beyond the scope of the research program.

Medical conditions such as epilepsy (Lindsay & Ryan, 2011) and attention deficit hyperactivity disorder (Fischer, Barckley, Smallish, & Fletcher, 2007; Rosenbloom & Wultz, 2011) have been found to influence the crash involvement of drivers; however these are not considered in the research program. Similarly, lifestyle (Chliaoutakis et al., 1999; Moller & Siguroardottir, 2009) and socioeconomic status (Berg, Eliason, Palmkvist, & Gregersen, 1999; Hasselberg, Vaez, & Laflamme, 2005) have also been found to be influential, however they are also beyond the scope of the research program. Whilst the indigenous status of the

participating young novice drivers is explored in the surveys of Stages Two and Three in recognition that culturally-specific difficulties are experienced by Aboriginal and Torres Strait Islanders (ATSI) (Somssich, 2009), the small sample size of participating indigenous persons precluded any analyses which specifically considers such cultural issues.

1.5 Structure of the dissertation

Quantitative and qualitative methodologies are operationalised in the research program to enable a comprehensive investigation of the risky driving behaviour of young novices undertaken across three stages. All three stages utilise state-wide sampling of young novice driver behaviours, attitudes and experiences, and whilst the three stages are cross-sectional in nature, the same participants completed the surveys in Stages Two and Three and therefore longitudinal analyses are also conducted. Stage One provided a foundation for the research undertaken in the remaining two stages.

Chapter Two is a literature review of the contributing factors to young driver crashes and countermeasures addressing these variables, and discusses the considerations in measuring the risky driving behaviour of young novices. It also identifies gaps in current knowledge, which informs the research questions underpinning the program of research. Chapter Three contains the literature review of the theoretical and methodological perspectives on young novice driver risky behaviour and positions the research program within the specific theoretical framework used to guide the research. Chapter Four provides an overview of the research program and the eleven publications comprising this thesis-by-publication. Chapters Five to Fifteen contain the eleven papers, positioned within the framework of Bandura's reciprocal determinism model outlined in Chapter Four. Chapter Sixteen is a general discussion of the research findings of the eleven papers, including the practical, theoretical and methodological implications, and strengths and limitations of the research program. Future research directions are also addressed. Chapter Seventeen contains the comprehensive reference list. Chapter Eighteen contains the appendices to the research program, and the survey instruments and interview questions relevant to each stage of the research are incorporated.

Chapter Two: Literature Review

2.1 Introductory comments

Chapter Two begins with a review of the contributing factors to young novice driver crashes. An examination of countermeasures implemented around the world will then be provided. The first three research questions will also be presented.

2.2 Contributing factors in young driver crashes

Research consistently demonstrates that young driver crashes and fatalities are associated with and influenced by a myriad of driver, journey, vehicle, and passenger characteristics and broader social factors as demonstrated in Figure 2.1.

Figure 2.1 Factors contributing to young novice driver crashes

As can be seen, many factors influence the driving behaviour of young novices and the crashes in which they are involved. Whilst these characteristics and influences are clearly demarcated within Figure 2.1, a multitude of these variables likely interact at any time to impact upon and influence the risky driving behaviour of

young novice drivers. The literature regarding each of these factors will be now reviewed, and the research program is designed to explore the nature and role of the majority of these influences in the risky behaviour of the young novice driver.

2.2.1 Driver characteristics

Driver characteristics that have been found to be associated with and influential in young driver crash and fatality involvement comprise sociodemographic characteristics, emotions, personality, and driving behaviour, skills, and attitudes.

2.2.1.1 Sociodemographic characteristics

Sociodemographic characteristics associated with and influential in young driver road safety include novice age, gender, ethnicity, education and employment.

2.2.1.1.1 Age and individual development

Whilst age and inexperience frequently have been confounded in investigations of young driver behaviour and risk factors (Clarke, Ward, Bartle, & Truman, 2006), younger age at full licensure is associated with more risky driving (Rhodes & Pivik, 2011), greater crash and offence rates. Swedish research has revealed that 18-19 year olds have nearly three times the odds of sustaining injury through a car crash than drivers who were licensed to drive independently when aged 25-26 years (Hasselberg & Laflamme, 2009). Further, after controlling for experience (length of licensure) younger age corresponds to increased crash risk, particularly compared to drivers aged 25 years and older (McCartt et al., 2009). There are also differences within the young driver cohort. In New South Wales in 2007, 11% of all drivers killed were males aged 17-20 years, and 6% of all drivers killed were males aged 21-25 years. Four percent of all driver fatalities were females aged 17-20 years, declining to 2% for females aged 21-25 (RTA, 2008). This may be attributable to a reduction in the frequency and extent of risky behaviours such as speeding (but not drink driving) performed by the young driver. To illustrate, recent Australian longitudinal cohort research reported a reduction in risky driving behaviours as the participants matured from 19-20 years to 23-24 years (Smart & Vassallo, 2005).

The development of the young driver appears to be pivotal (Bingham, Shope, Zakrajsek, & Raghunathan, 2008; Jessor, Turbin, & Costa, 1997). The physical,

psychological, social, and biological development of the individual appear to be inextricably intertwined in their influence upon the behaviour of the adolescent, including the risky driving behaviour of the young novice driver. As such, developmental factors should be borne in mind when investigating the risky driving behaviour of young novice drivers, and the breadth and mechanisms of influences upon this risky driving behaviour. Adolescence is characterised by increased vulnerability to negative peer influences (Bonino et al., 2005) (see section 2.2.3.2), and as such young novice drivers may be more likely to drive in a risky manner when they carry their friends as their passengers. Adolescence is also characterised by the forging of social identity, a tumultuous period of psychosocial development which has been found to be associated with psychological distress evidenced as anxiety and depression (see section 2.2.1.2.1). Identity development is also impacted upon by peer influence. Importantly, neurological maturation continues until the mid-twenties (Gogtay et al., 2004; Steinberg, 2008), and the physical maturation associated with puberty can alter sleep patterns of the adolescent (see section 2.2.1.3.4). In addition, sensation seeking can contribute to psychosocial development (see section 2.2.1.2.4), and is frequently undertaken in the presence of peers. Each of these developmental factors can influence the decision-making (Allen & Brown, 2008; Keating & Halpern-Felsher, 2008), and therefore the risky driving behaviour, of the young novice driver.

2.2.1.1.2 Gender

Young male drivers engage in more risky driving than females (Jelalian et al., 2000; Rhodes & Pivik, 2011), and whilst the gap between the sexes has reduced in recent years (e.g., in New South Wales, Chen et al., 2010a), males consistently exceed the crash fatality rates of young female drivers, as can be seen in Figure 2.2. In Australia in 2009 young male drivers contributed 9.1% of the road toll, compared to 2.8% by young female drivers. Of the 178 fatally-injured drivers aged 17-25 years, 76.4% were male who experienced 19.0 deaths per 100 000 population, three times the rate of young females. These rates are more than double that of drivers twice their age (drivers 40-59 years: males 9.9 deaths/ 100 000 population, females 3.4 deaths/ 100 000 population) (DITRDLG, 2010), a trend repeated across the globe (e.g., Great Britain, Gray, Quddus, & Evans, 2008; United States, Williams, 2003). In the first year of licensure, compared to young female drivers, young male Swedish drivers

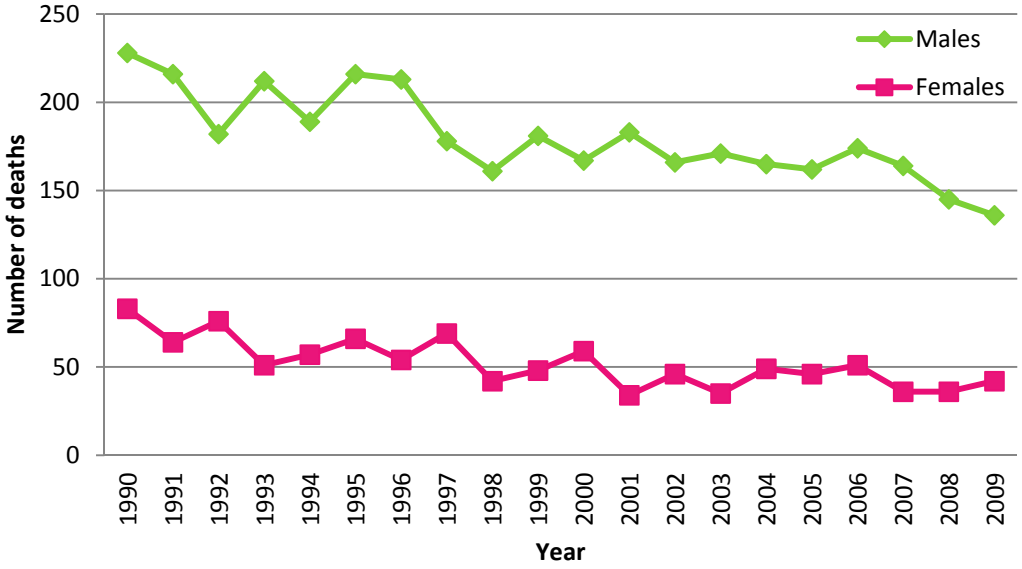


Figure 2.2 Driver deaths aged 17-25 years by gender– Australia 1990 to 2009

Adapted from "Road Deaths Australia, 2009 Statistical Summary", by Department of Infrastructure, Transport, Regional Development and Local Government, 2010.

were found to have a five-fold higher rate of single vehicle crash and a 25% higher rate of crash morbidity (Monnarez-Espino, Hasselberg, & Laflamme, 2006).

High rates of crashes and offences are also reported by young drivers in surveys. Twenty-five percent of male and 33% of female high school students in the United States reported they had been involved in at least one crash during their first two years of independent licensure (Lang, Waller, & Shope, 1996). Another survey found that whilst males and females reported the same crash rate, males had twice the likelihood of females of receiving an infringement notice for a traffic offence during the first year of independent driving (McCartt et al., 2003). Notwithstanding that young males also engage in more driving (with associated greater exposure to driving risks) (Berg et al., 1999; Kweon & Kockelman, 2003; Prato, Toledo, Lotan, & Taubman-Ben-Ari, 2010), it does not appear the overrepresentation of young male drivers is due to greater exposure compared to young females (Laapotti & Keskinen, 2004; Romano, Kelley-Baker, & Voas, 2008). For males driving can be seen as an extension of masculinity, therefore driving styles may be vulnerable to negative social influences (Redshaw, 2006; Williams & Sheehan, 2005). Personality factors such as sensation seeking also contribute to the risky driving of young males.

2.2.1.1.3 Ethnicity

Given the multicultural nature of many motorised countries around the world, researchers have examined the role of ethnicity in the driving behaviour of young novices. Swedish research found no difference in crash involvement of native and immigrant drivers, after controlling for socioeconomic status (Hasselberg & Laflamme, 2008). A recent young novice cohort study in New South Wales reported Australian-born drivers engaged in the most self-reported risky driving, and drivers born in Asian countries engaged in the least. Alarmingly, the longer Asian-born drivers lived in Australia the more risky their driving became, suggesting they were vulnerable to the driving norms of their adopted country (Boufous et al., 2010a). Asian-born drivers in this cohort were also found to be less likely to engage in pre-Licence driving than their Australian counterparts (Senserrick et al., 2010).

2.2.1.1.4 Education and employment

A longitudinal Australian study has reported significant relationships between the education and employment and the on-road behaviour of young drivers. To illustrate, drivers with lower levels of secondary education, who were more likely to be employed and less likely to be studying were more likely to be detected for multiple speeding violations (Smart & Vassallo, 2005). The reasons for this relationship remain unknown, however, and require further exploration.

2.2.1.1.4 Rurality

Young drivers living in an urban area are involved in more crashes than young drivers living in a rural area (Kloeden, 2008b; Laapotti & Keskinen, 2004; Malchose & Vachal, 2011; Peek-Asa, Britton, Young, Pawlovich, & Falb, 2010; Stevenson & Palamara, 2001), however young drivers from rural areas are more likely to have single-vehicle crashes (Chen et al., 2009). Greater risk of fatality (Chen et al., 2010b) and hospitalisation (Kmet & Macarthur, 2006) has been found for rural drivers for various reasons such as higher travelling speeds and greater distances for medical assistance. Furthermore, rurality may reflect disparities in socioeconomic status with drivers from higher socioeconomic backgrounds more likely to able to afford to live in urban areas, and to drive vehicle with more crash-avoidance and -protection features which may also be pivotal in crash outcomes. Notwithstanding this, in Queensland in the five years to 31 December 2010, 72.0% of all fatalities and 78.9%

of all hospitalisations from a crash involving a young driver occurred in major cities and inner regional areas (DTMR, 2011c). Rural drivers have also been found to engage in more pre-Licence driving (Begg et al., 2010; McDowell, Begg, Connor, & Broughton, 2009; Senserrick et al., 2010). Research suggests that risky driving by young drivers, and males in particular, in rural areas is due to their risk perceptions and beliefs regarding a reduced risk of detection by police (Rakauskas, Ward, & Gerberich, 2009).

2.2.1.2. Emotions and personality

Emotions and personality characteristics influential in young driver road safety include psychological distress, sensitivity to punishments and rewards, and sensation seeking propensity.

2.2.1.2.1 Emotional state

Young drivers appear to be developmentally-prone to emotional driving. Three-quarters of youth surveyed in America report they had seen teens driving whilst experiencing strong negative and positive emotions such as anger or excitement; over half reporting they had seen instances of road rage (CHOP, 2007). Strong emotions may emerge during the journey; for example Learners in Victoria reported they and their supervisor became upset during some of their journeys (Harrison, 2004). Becoming angry during a drive in an instrumented vehicle resulted in more speeding by greater amounts (Mesken, Hagenzieker, Rothengatter, & de Waard, 2007), and aggression predicted crash involvement in longitudinal research in New Zealand (Gulliver & Begg, 2007) and high-risk driving by young drivers in Norway (Ulleberg, 2002). Young drivers also are vulnerable to impression management (Leary & Kowalski, 1990; Leary, Tchividjian, & Kraxberger, 1994) and the psychosocial purpose of the risky driving (Moller, 2004; Moller & Gergersen, 2008) and perceived 'vehicle personality' is associated with self-reported aggressive driving (Benfield, Szlemko, & Bell, 2007). Young drivers, particularly young males, report their driving changes in response to stressful events (Lonczak et al., 2007).

2.2.1.2.2 Psychological distress

Young novice drivers, by virtue of their age, are frequently adolescents who are undergoing physiological, cognitive, social and behavioural development (Sprinthall

& Collins, 1995). This maturation can have implications for risky behaviour (Dahl, 2008), and of note for road safety researchers is the increased incidence of psychological distress experienced by the adolescent as anxiety and depression. Depression is characterised as the experience of psychological distress and may be a transient state reactive to an adverse life event, or may be more persistent (Avenevoli, Knight, Kessler, & Merikangas, 2008). The vulnerability of the adolescent to depression has been found to be related to the processing of social rewards and maturation of the prefrontal cortex (Davey, Yucel, & Allen, 2008), and the effects of depression on the adolescent are pervasive (Jaycox et al., 2009). Research undertaken in the United States estimates the prevalence of depression in adolescence to be 24% (Avenevoli et al., 2008); further suggesting 1 in 10 adolescents are depressed at any time (Strine et al., 2008).

There are also differences in the experience of psychological distress for each gender and over the developmental period of adolescence, irrespective of ethnicity (Huang, Xia, Sun, Zhang, & Wu, 2009), with greater prevalence of depression in females (Paxton, Valois, Watkins, Huebner, & Drane, 2007) who tend to experience symptoms earlier (Avenevoli et al., 2008). Depression and psychological distress have been found to be associated with risky behaviours such as unprotected sex (Swanholm, Vosvick, & Chng, 2009), cigarette smoking and unsafe levels of alcohol consumption (Waller et al., 2006), physical inactivity and obesity (Strine et al., 2008), and eating disorders (Darby, Hay, Mond, Rodgers, & Owen, 2007).

Whilst road safety researchers acknowledge psychological distress is likely to impact upon driving behaviour (e.g., Lonczak et al., 2007; Schwebel, Severson, Ball, & Rizzo, 2006), there has been limited research regarding the relationship between psychological distress and young novice risky driving. Recent research revealed that risky driving (e.g., distracted driving) by university students was related to high levels of anxiety (Ferreira, Martinez, & Guisande, 2009), and frequent drink-driving offenders were found to have significantly higher levels of depression and anxiety than the general population (Hubicka, Kallmen, Hiltunen, & Bergman, 2010). As many as five decades ago, researchers suggested that single-vehicle and single-occupant car crashes may indeed include ‘socially acceptable suicides’, chosen by depressed young males in particular (Jenkins & Sainsbury, 1980; Peck & Warner, 1995), and greater psychological distress is associated with greater suicidal ideation (Avenevoli et al., 2008). Suicide-by-car is beyond the scope of the research project.

Victorian young drivers who reported high levels of risky driving (e.g., speeding, drink driving) previously reported 1.7 and 1.4 times the levels of anxiety and depression respectively as low-level risky drivers (Vassallo et al., 2008). Other research has reported no relationship between psychological distress and risky driving; however these findings are confounded by time lags of two (Martiniuk et al., 2010) and five years (Begg, Langley, & Stephenson, 2003) between the measure of psychological distress and the subsequent risky driving behaviour.

2.2.1.2.3 Sensitivity to punishment and reward

Rewards and punishments are pivotal in the learning, repetition, and cessation, of behaviour including risky driving. Rewards are motivating, acting as incentives to gain expected outcomes, and are reinforcing. Therefore they are pivotal in learning new behaviours (Beck, 1990). Anticipated rewards such as a faster journey, rewards received previously for engaging in risky driving such as feelings of excitement (see 2.2.1.4) and status in the peer group (see 2.2.3.2), motivate and reinforce risky behaviours such as speeding, thereby increasing the likelihood the young novice speeds in the future. Punishments serve to prevent, curtail, or extinguish learned behaviours (Beck, 1990). The young driver who is detected speeding and receives a fine and demerit points is less likely to speed in similar circumstances in the future. Therefore driving behaviour is constantly altered by its consequences (Fuller, 2002).

Besides the external (lack of) administration of rewards and punishments by significant others (see also 2.2.3), the young novice can be motivated by their perceived rewards (advantages) and punishments (disadvantages) for risky driving. Sensation seeking through risky driving can be rewarding for the young novice (Rimmo & Aberg, 1999), and behaviours which elicit pleasurable sensations are more likely to be repeated, whilst behaviours which do not are less likely to be repeated. This is further validated by the finding that risky drivers report more advantages and fewer disadvantages for risky driving than drivers who are not risky drivers (Deery, 1999; Horswill et al., 2004; Horvath et al., 2012). Avoiding negative consequences was also rewarding for a group of young male novice drivers who reported being involved in a speed-related crash without incurring personal harm, thereby reinforcing driving in excess of speed limits (Falk & Montgomery, 2007).

The role of rewards and punishments within the risky behaviour of the young novice driver merits further consideration. As will be seen when sensation seeking

and social influences are explored further in 2.2.1.2.4 and 2.2.3 respectively, it is inherently assumed that the young novice receives rewards and punishments from undertaking risky driving, whether implicitly and explicitly from significant others such as peers, parents and police, or personally from an 'adrenalin-rush' or similar emotional responses. However these theories do not consider that whilst the young driver may indeed implicitly/ explicitly receive rewards/ punishments for the risky behaviour, the young driver may not be personally *sensitive* to these rewards and punishments. Therefore removing, increasing or altering these in an intervention or policy response may simply have no effect upon the young driver's behaviour. As will be seen in 2.3, a number of young driver road safety countermeasures rely extensively upon the threat of punishment to curtail risky driving. Accordingly the research program has significant theoretical and practical implications for understanding, and subsequently intervening in, young driver risky behaviour in Queensland, Australia, and internationally.

2.2.1.2.4 Sensation seeking propensity

Frequently young drivers report they drive for reasons other than an economical and efficient means of travel. Of particular concern is driving to facilitate sensation seeking (see Jonah, 1997, for a review), such as expressing feelings of excitement, anger, frustration (Arnett, Offer, & Fine, 1997; Sullman, 2006), and competitiveness (Ulleberg, 2004). It is noteworthy that within the research program, sensation seeking is in the context of the young novice enjoying exciting sensations. This is problematic for road safety, as the young novice may change the way they drive so they can take risks to experience the accompanying thrill. For example, young male drivers frequently report they like to engage in sensation seeking behaviours (Begg & Langley, 2004; Dahlen, Martin, Ragan, & Kuhlman, 2005; Jonah, 1997; Schwebel et al., 2006) including risky behaviour such as speeding (Rhodes & Pivak, 2011).

A desire for thrill seeking contributed to one quarter of young novice drivers' offences (Ross & Guarnieri, 1994, cited in Cavallo, Montero, Sangster, & Maunders, 1997), and sensation seeking propensity has been found to be associated with risky driving, offences and crashes (Rimmo & Aberg, 1999). Young people who reported sensation seeking through behaviour such as speeding also reported more than double the incidence of being injured in a car crash during the previous year compared to young drivers who did not engage in such risky behaviour (Blows,

Ameratunga, Ivers, Lo, & Norton, 2005). Some young male drivers also report they 'hoon' by lapping (low speed driving accompanied by loud music) and doing burnouts (loud noise and smoke from spinning tyres on the road tarmac), and engage in more aggressive driving, such as honking horns, merging closely to the front of the vehicle being overtaken (Shinar & Compton, 2004), and using rude gestures (Sullman, 2006). Drivers who engage in hooning report significantly more offences, including speeding (Leal, Watson, & Armstrong, 2010).

Research repeatedly documents more favourable attitudes towards risky driving such as speeding (e.g., Waylen & McKenna, 2008), more risky driving behaviours (Jonah, 1997; Schwebel et al., 2006; Ulleberg, 2002; Zuckerman, 1994, 2007) such as drink driving (Fernandes, Job, & Hatfield, 2007) and driving offences in particular (Rimmo & Aberg, 1999; Schwebel et al., 2006), in drivers exhibiting greater sensation seeking propensity. Furthermore, research persistently reports that males have a higher sensation seeking propensity than females (e.g., Arnett et al., 1997; Waylen & McKenna, 2008). In addition, sensation seeking has been found to be a predictor of adolescent risky behaviour in longitudinal research, younger adolescents with greater propensity at baseline reporting significantly more smoking and drinking after two years (Sargent, Tanski, Stoolmiller, & Hanewinkel, 2010). Sensation seeking via engaging in risky behaviours is normative for adolescents, and it serves many purposes including the development of identity and autonomy (Bonino, Cattelino, & Ciairino, 2003; Johnson & Malow-Iroff, 2008). As such, sensation seeking appears to be inherently rewarding, and in accordance with the reinforcing effects of rewarding behaviours as discussed thus far, sensation seeking behaviour is likely to be repeated. Sensation seeking by the adolescent is very risky when the similarly-normative optimism bias is coupled with a powerful vehicle in an unforgiving environment (Keating, 2007).

2.2.1.3 Driving behaviours, skills and attitudes

Driving behaviours, skills and attitudes influential in young driver road safety include driving experience and licence status. Seat belt use; impairment by alcohol, illicit drugs and fatigue; inattention and distraction; and prior driving behaviours are of interest to the research program. Further, skills in hazard perception, self-calibration, self-awareness and self-reflection; attitudes, norms and expectancies; and

driving intentions and willingness have also been found to be influential in the risky behaviour of young novice drivers.

2.2.1.3.1 Driving experience and licence status

Whilst crash involvement rates increase sharply when novices progress from a Learner to a Provisional licence – a time when the novice does not have extensive independent driving experience – crash involvement rates reduce considerably within the first two years of independent driving (Kloeden, 2008a; Lee, Simons-Morton, Klauer, Ouimet, & Dingus, 2011; McCartt, Shabanova, & Leaf, 2003; McKnight & McKnight, 2003; Mayhew, Simpson, & Pak, 2003). Therefore gaining more on-road driving experience is associated with less risk for the young novice: the risk of being involved in an at-fault crash decreasing at roughly 6% respectively per year of licensure, and at a greater rate for female than male novice drivers (Waller, Elliott, Shope, Raghunathan, & Little, 2001). In Sweden, decreasing the Learner licensing age from 17.5 years to 16 years, resulting in a longer period to obtain supervised driving practice, has been found to reduce the risk of crashes for the 18 year old intermediate driver (Gregersen et al., 2000).

New Zealand and Australian research suggests that novices drive on the road before obtaining a valid licence (pre-Licence driving). Nearly 75% of Learners surveyed in Victoria (Harrison, 2004); and half of Maori drivers in New Zealand (McDowell et al., 2009) reported pre-Licence driving. Pre-licence drivers have predominantly been found to be male (Frisch & Plessinger, 2007; Hanna, Taylor, Sheppard, & Laflamme, 2006; Heck, Sousa, Hanna, & Nathaniel, 2008; Lam, 2003a; Senserrick et al., 2010). Pre-Licence drivers are subsequently at double the risk of crash involvement as a Provisional driver (Stevenson & Palamara, 2001), and more likely to be at fault in these crashes (Williams, Preusser, Ferguson, & Ulmer, 1997). Recent American research exploring unlicensed driving of high school students reported drivers also placed themselves at greater risk by not wearing seatbelts and driving after consuming alcohol or illicit drugs (Elliott, Ginsburg, & Winston, 2008).

The Learner period is comparatively safe as the young novice develops their driving and hazard perception detection and response skills under the supervision of an experienced driver. Unsupervised driving as a Learner is risky, however, and 18% and 35% of Learners aged 16-17 and 20-24 years respectively who were involved in Police-reported crashes in New South Wales between 1996 and 2000 were driving

unsupervised (Lam, 2003b). The Provisional period is particularly risky for the young novice. Similar proportions of Queensland's drivers hold a Learner and a Provisional licence (in 2010, 5.7% of the licensed driving population held a Learner licence and 5.3% held a Provisional licence, DTMR, 2011a); however a far greater proportion Provisional drivers are involved in more crashes of greater severity (in the five years to 30 June 2009, 5.1% of drivers involved in hospitalisation crashes held a Learner licence whilst 48.8% held a Provisional licence, DTMR, 2011c).

2.2.1.3.2 Seat belt use

Some young drivers travel unrestrained by seatbelts, behaviour which is associated with reduced safety outcomes (Calisir & Lehto, 2002; Norris et al., 2000). In Australia, legislation requiring that seatbelts be worn by vehicle occupants at all times was introduced in the early 1970's (Milne, 1985). Young drivers comprised 26% of all unrestrained fatalities in the five-year period to 31 December 2010 in Queensland (DTMR, 2001c), and this is consistent with their overrepresentation in fatal crashes. Young passengers tend to follow the seat belt-wearing of the young driver (Begg & Langley, 2000), with seat belts least likely to be used when multiple young passengers are present at night (McCartt & Northrup, 2004). Male and female Victorian drivers aged 19-20 years report they do not wear a seat belt at all in more than 11% and 6% of their journeys respectively, and wear a seatbelt for only part of the trip 15% and 9% of the time respectively (Vassallo et al., 2007).

Five percent of novice drivers in South Australia had been detected for at least one seatbelt offence in the first three years of their Provisional licence (Kloeden, 2008a). Drivers travelling unrestrained in police-reported crashes in America account for 42% of crash costs, and using a seatbelt would reduce the total costs of these crashes by 24% (Miller, Lestina, & Spicer, 1998). Furthermore, young drivers have occasionally been found to carry more passengers within the cabin of passenger vehicles than there are seats (and therefore seatbelts) (e.g., see Calligeros, 2009; Vogler & Hinde, 2009), which is associated with increased risk of injury to all unfastened occupants in the event of a crash.

2.2.1.3.3 Impairment by alcohol and illicit drugs

Alcohol was involved in 20% of all fatal crashes in Queensland in 2010 (DTMR, 2011a). In Queensland during the five years to 31 December 2010, 23.7% of young

adult drivers involved in fatal crashes were drink driving (driving in excess of the legislated blood alcohol concentration limit) (DTMR, 2011c), and drivers aged 17-20 years killed in New South Wales in 2007 exceeded the legal blood alcohol concentration (BAC) in 63% of fatal crashes (RTA, 2008). Age and alcohol appear to have an interactive effect, rather than a simple additive effect, increasing relative crash risk particularly for the young driver (Peck, Gebers, Voas, & Romano, 2008). Fatalities among young drivers are 47% more likely to be alcohol-related than those among older drivers (Queensland Transport, 2005a), and alcohol-involved crashes tend to be more severe (Rosman, Ferrante, & Marom, 2001) with greater risk of driver fatality (Keall, Frith, & Patterson, 2004). Three percent of novices in South Australia had been detected for an alcohol-related offence in the first three years of their Provisional licence (Kloeden, 2008a). In Australia in 2006-2007, drivers aged 20-24 years accounted for twice as many criminal court convictions for drink driving as drivers aged 30-34, with males comprising 80% of convictions (ABS, 2008).

Young drivers also report drink driving, with 1 in 5 males and 1 in 10 females in Victoria driving after drinking alcohol (Vassallo et al., 2007). One in 8 American high school students reported drink driving in a national survey in 2003 (Chen et al., 2008), and 27.7% of American college students reported drink driving (Everett, Lowry, Cohen, & Dellinger, 1999). Interestingly young females were almost four times more likely to travel with a drinking driver than young males (Harre, Field, & Kirkwood, 1996), and half of surveyed American teens reported they had seen their friends drive whilst under the influence of alcohol (CHOP, 2007, 2009). Nearly 1 in 7 Queensland motorists admit to driving after using illicit drugs (Furler, 2007). One in 10 young drivers in Victoria reported drug driving, and more males reported drug driving than females (11% vs 8.5% respectively) (Vassallo et al., 2007). More than a quarter of recreational drug users had driven within three hours of taking the drug, with 70% being young males (DTMR, 2008). Whilst a sample of young drivers who reported engaging in drug driving had not been detected for the behaviour, nearly 3 in 10 had been detected for a different risky driving-related offence, 94% of which was speeding (Armstrong, Wills, & Watson, 2005). Two in five surveyed American teens reported they had seen their friends drive whilst under the influence of marijuana (CHOP, 2007).

Alcohol-intoxicated young drivers are more risky drivers, being more likely to travel closer to the vehicle in front (Leung & Starmer, 2005) and have difficulty

maintaining lane position (Harrison & Fillmore, 2005). The likelihood of driving after drinking, or being a passenger of a drinking driver, increases five-fold for the driver who drinks alcohol in conjunction with illegal drugs and the young drink driver is also significantly less likely to wear a seatbelt (Everett et al., 1999). Young novices who crashed whilst drink driving in the United States between 2005 and 2009 were more likely to be males who were speeding and not wearing a seatbelt, carrying passengers on a weekend night (Williams, West, & Shults, 2011), highlighting the link between drink driving and other risky driving. A Danish study reported a 25 times greater risk of harm from driving after using illicit drugs either alone or in combination, increasing to 35 times greater if the driver had also consumed alcohol (Mathijssen & Hourwing, 2005, cited in Twisk & Stacey, 2007).

Illicit drugs such as marijuana (THC, cannabis), speed (meth-amphetamine), cocaine, and ecstasy have been found to negatively impact on driving abilities by reducing alertness and concentration whilst increasing reaction times (Donald, Pointer, & Weekley, 2006). Cannabis has been found to be the most popular recreational drug amongst illicit drug users (ABS, 2008), and it is frequently combined with alcohol (Ronen et al., 2008). Driving under the influence of cannabis has been found to double the risk of car crash for young drivers (Asbridge, Poulin, & Donato, 2005), and the risk may in fact be greater than that associated with driving under the influence of alcohol (Fergusson, Horwood, & Boden, 2008).

2.2.1.3.4 Impairment by fatigue

Continuing to drive whilst drowsy (that is, whilst ‘fatigued’ or ‘sleepy’) has been found to contribute to young driver crashes (Hutchens, Senserrick, Jamieson, Romer, & Winston, 2008), and naturalistic driving studies reveal driving drowsy increases the risk of a crash or near-crash by four- to six-times (Klauer, Dingus, Neale, Sudweeks, & Ramsey, 2006). Whilst identifying fatigue-related crashes is difficult (Grigo & Baldock, 2011), fatigue was estimated to be involved in 12% of Queensland’s road fatalities in the year to July 2011 (DTMR, 2011b). Twenty-eight percent of drivers involved in fatigue-related crashes in Queensland in the five years to 31 December 2010, and 33% of hospitalisations in the five years to 30 June 2009, involved drivers aged 17-24 years (DTMR, 2011c). Nearly two thirds of young Victorian drivers advised they had driven when very tired (Vassallo et al., 2007), while three-quarters of surveyed teen drivers also reported they had seen other young

teens drive when tired (Children's Hospital of Philadelphia (CHOP), 2009).

Young drivers may be particularly susceptible to the negative effects of fatigue, such as reduced hazard perception ability (Smith, Horswill, Chambers, & Wetton, 2009), for a number of reasons (Dahl, 2008; Groeger, 2006). Disrupted sleep patterns during adolescence can contribute to pervasive fatigue (Groeger, 2006). Young drivers may also have poor quality sleep associated with heavy workloads due to study, work and/or family commitments and hobbies such as sport, and they typically drive at times in conflict with circadian rhythms which may also involve alcohol and carrying peers who may be a negative influence upon their behaviour (Chin, 1998; Papadakaki, Kontogiannis, Tzamalouka, Darviri, & Chliaoutakis, 2008). Fatigue-related crashes are often more severe due to a lack of evasive maneuvers (Smith, Carrington, & Trinder, 2005). Interestingly, young drivers report that they can perceive their sleepiness and the effects it is having on their driving, with half the fatigued drivers indicating they would keep driving whilst implementing efforts to stay awake such as singing and lowering the car windows (Lucidi et al., 2006). This suggests they may be unaware of impending sleep associated with such fatigue (Smith et al., 2005), or that driving to and arriving at their destination as planned is more important than resting when fatigued.

2.2.1.3.5 Inattention and distraction

Inattention – including distraction from the driving task – has been identified as a contributor in young novice driver crashes (Neyens & Boyle, 2007), and inattentive drivers make risky driving decisions (Horberry, Anderson, Regan, Triggs, & Brown, 2006), such as misjudging gaps in traffic or not considering factors such as road slipperiness due to rainfall (Cooper & Zheng, 2002). Australian research based on Police reports has identified Learner drivers of all ages appear to be most affected by distractions from inside and outside the vehicle (Lam, 2003b). Identifying crashes as arising from driver inattention can be difficult, and an American study reported that police concluded inattention was involved in 32% of fatal crashes involving a 16 year-old driver (Williams, Preusser, & Ferguson, 1998, cited in Williams, Ferguson, & McCartt, 2007). Young drivers are more likely to be at fault in crashes through inattention (Zhang, Fraser, Lindsay, Clarke, & Mao, 1998) as they are less experienced in the multitude of cognitive, information processing, and behavioural demands of the driving task (Evans, 1991; Gregersen et al., 2000).

Young drivers may be temporarily distracted by factors that are beyond their control, such as by roadside features (Crundall, Van Loon, & Underwood, 2006), or voluntary factors such as smoking cigarettes (Lonczak et al., 2007). Physical and verbal interactions with young passengers can also distract the young driver (Gugerty, Rakauskas, & Brooks, 2004), and young drivers also appear to be unaware of the extent and effects of distraction (Horrey, Lesch, & Garabet, 2008). Distraction whilst drink driving significantly impaired simulator driving performance of 21-35 year old drivers (Harrison & Fillmore, 2005), and it is reasonable to surmise the effects would be greater among less-experienced young novice drivers.

Driving whilst using technological devices in the car, such as radios, compact disc players, navigation devices, and, most-commonly, mobile telephones (Traffic Injury Research Foundation (TIRF), 2011) have been found to distract the inexperienced young driver from the driving task (Blanco, Biever, Gallagher, & Dingus, 2006; Ferguson, 2003; Lee, 2007). Young people have the highest rates of mobile phone ownership (Lamble, Rajalin, & Summala, 2002), and report the highest use of mobile phones during driving (Poysti, Rajalin, & Summala, 2005; Riquelme, Al-Sammak, & Rios, 2010) such as initiating, reading and responding to texts (Atchley, Atwood, & Boulton, 2011). French research has found young female drivers report more mobile phone use than males (Brusque & Alauzet, 2008), and mobile phones have been found to be pivotal in maintaining close social bonds and group belongingness for Australian youth (Walsh, White, & Young, 2009).

Naturalistic driving studies reveal that eye diversion from the road for more than two seconds doubles the risk of a crash or near-crash (Klauer et al., 2006). Using mobile phones increases the likelihood of rear-end collisions in particular (Consiglio, Driscoll, Witte, & Berg, 2003; Rosenbloom, 2006) as young novice drivers follow too closely (Neyens & Boyle, 2007) and have increased reaction times (Caird, Willness, Steel, & Scialfa, 2008; Tokunaga, Hagiwara, Kagaya, & Onodera, 2000). Mobile phones can also facilitate internet access whilst driving, and college students who access the web whilst driving report approximately twice as many offences and crashes as those students who do not (Cook & Jones, 2011).

Eighty percent of teen drivers recently surveyed in America advised they had their own mobile phone, 90% had seen other teens talk on a mobile phone whilst driving, and half stated they had driven and talked on a mobile phone themselves. Half the surveyed teens had also seen other teen drivers use a hand-held device, such

as using an MP3 player, whilst driving (CHOP, 2007). Using an iPod whilst driving in a simulated task increased both reaction times and the crash involvement of young drivers (Chisholm, Caird, & Lockhart, 2008). Mobile phone users have also been observed to have reduced seatbelt wearing rates (Eby & Vivoda, 2003), while regular mobile phone users report more frequent speeding, crashes and driving violations (Schlehofer et al., 2010). In addition, distraction by complex conversations with passengers (Tokunaga et al., 2000) and by dialing on a hands-free mobile phone (Tornros & Bolling, 2005) has been associated with more severe injuries than distraction by other in-vehicle devices (Neyens & Boyle, 2008).

2.2.1.3.6 Prior driving behaviour

Research suggests that for drivers of all ages there is a relationship between prior and current risky behaviour *(*e.g., Elliott & Thomson, 2010; Norman & Conner, 2005), a crash predicting a subsequent crash (Norris et al., 2000). Offences also increase the likelihood of drivers subsequently being involved in a car crash (SWOV, 2011), and prior risky driving is associated with crashes and near-crashes (Simons-Morton et al., 2011). A longitudinal cohort study of 17 year old drivers in Western Australia over a 36-month-period found that whilst 66% had incurred a speeding offence, 61% of the offenders had been detected multiple times during the follow-up period (Palamara & Stevenson, 2003). In addition to repeated speeding (Falk & Montgomery, 2007), drivers who crash are more likely to crash again, and drivers who have been detected for an offence are more likely to again be detected for an offence (e.g., drink driving offences, Ferrante, Rosman, & Marom, 2001).

2.2.1.3.7 Hazard perception, situational awareness, and optimism bias

Cognitive-perceptual driving skills such as hazard recognition and situation awareness are vital for successfully negotiating the driving environment and take many years to fully develop, and experienced drivers accurately detect hazards more quickly than inexperienced novices (Whelan, Senserrick, Groeger, Triggs, & Hosking, 2004). Unsurprisingly the underdeveloped hazard perception abilities of the young novice have been found to contribute to their increased involvement in car crashes (Boufous, Ivers, Senserrick, & Stevenson, 2011; OECD, 2006; White, Cunningham, & Titchener, 2011). Situation awareness pertains to the perception of and an understanding of the range of features in the driving environment and how

they relate to the driver's goal, and the anticipated future actions of these features based on both experience and perception (Endsley, 1995, cited in Whelan et al., 2004). Experienced drivers are more situationally-aware than inexperienced novices, able to recall lane occupancy more accurately (Whelan et al., 2004), and commit less driving offences during simulated tasks (Kass, Cole, & Stanny, 2007). Developing hazard perception and situation awareness abilities requires time and exposure to a wide variety of driving situations (Catchpole, Macdonald, & Cairney, 1997; Deery, 1999; Macdonald, 1994) which places the novice at considerable risk of injury as they do not perceive (Borowsky, Shinar, & Oron-Gilad, 2010; Lee et al., 2008; Whelan, Senserrick, Groeger, Triggs, & Hosking, 2004), or underestimate, the potential danger of various driving hazards (Lee, 2007; Senserrick, 2006).

Young novice drivers also appear to rate their driving abilities highly (Horswill, Waylen, & Tofield, 2004; Tronsmoen, 2008). Young novice drivers in Finland and Sweden were consistently overconfident in their assessments of their driving ability when compared to assessments by a driving examiner (De Craen, Twisk, Hagenzieker, Ellffers, & Brookhuis, Mynttinen et al., 2009). The novice's subjective self-assessment of their driving ability does not correlate highly with their objectively-measured hazard perception abilities (Farrand & McKenna, 2001). Over-confidence and a greater willingness to engage in risky behaviours, of which they underestimate the associated risk, was reported by more younger drivers than older, more experienced drivers (Hatfield & Fernandes, 2009). In addition, self-assessment of driving skills and the thrill experienced through risky driving was associated with risky driving behaviour (McKenna & Horswill, 2006). Optimism bias (Weinstein, 1980), coupled with underdeveloped hazard perception skills, also places the novice at greater risk of injury and fatalities (White et al., 2011). Young drivers, and young males in particular, tend to exhibit crash-risk optimism (Harre & Sibley, 2007), and 'over-confident' novice drivers report more speeding and mobile phone use during their journeys (Catchpole & Styles, 2005). Accordingly, optimism bias, overconfidence and hazard perception deficits combine to place the young novice driver at greater risk (Deery, 1999; Tronsmoen, 2008).

2.2.1.3.8 Attitudes, norms and expectancies

Research repeatedly demonstrates driver behaviour is influenced by both attitudes and norms (e.g., De Pelsmacker & Janssens, 2007; Iversen, 2004; O'Connell, 2002),

and favourable attitudes regarding the social acceptability of risky driving behaviours like speeding, predispose the young driver to such risky behaviour (Harrison, Fitzgerald, Pronk & Fildes, 1998; Machin & Sankey, 2008). Both driver attitudes and norms are learnt by the young driver, and there is evidence that these develop *before* the young novice driver actually has a driver's licence. Male pre-licence drivers also report more risky attitudes and intentions than females (e.g., Berg, 2006; Beullens & Van den Bulck, 2008; Carcary, 2002; Waylen & McKenna, 2008), and pre-Licence drivers report increasingly risky attitudes towards driving (e.g., speeding), as they mature towards licensing age (Mann & Lansdown, 2009). This is important as attitudes have been found to predict changes in behaviour (Gerrard, Gibbons, Benthin & Hessling, 2003), including risky driving, such that young drivers who report more risky attitudes towards driving report more risky driving; and risky driving behaviour predicts changes in attitudes towards risky driving, with the most risky drivers reporting less concern regarding their personal health and safety (Gibbons & Gerrard, 1995). Structural equation modeling also has revealed that driving attitudes mediate the influence of personality traits such as sensation seeking on risky driving behaviours (Ulleberg & Rundmo, 2003).

Expectancies also contribute to the development of attitudes and engagement in risky behaviour. Broader social influences from peers and parents have been identified as sources of expectancies regarding the anticipated effects of engaging in risky behaviour (e.g., alcohol consumption, Brown, Tate, Vik, Haas, & Aarons, 1999; Dunn & Goldman, 1998; Scheier & Botvin, 1997; drink driving, Chen, Grube, Nygard, & Miller, 2008; smoking, Simons-Morton et al., 1998). Similar to attitudes towards driving, expectancies regarding alcohol consumption are apparent before the adolescent has tried drinking alcohol, and more favourable expectancies are reported by drinking youth than non-drinking youth (Dunn & Goldman, 1998).

2.2.1.3.9 Intentions and willingness

A preponderance of road safety research examines the predictors of intentions for a variety of risky driving behaviours for drivers of all ages (e.g., Desrichard, Roche, & Begue, 2007; Forward, 2009; Parker, Manstead, Stradling, Reason, & Baxter, 1992), including speeding (e.g., Cestac, Paran, & Delhomme, 2011; Elliott, Armitage, & Baughan, 2003; Elliott & Thomson, 2010), driving under the influence of alcohol (e.g., Beullens & Van den Bulck, 2008; Marcil, Bergeron, & Audet, 2001), and using

a mobile whilst driving, including texting (e.g., Nemme & White, 2010; Walsh, White, Hyde, & Watson, 2008; Zhou, Wu, Rau, & Zhang, 2008). Research suggests there is a relationship between future intentions and actual driving behaviour (De Pelsmacker & Janssens, 2007). Importantly, exposure to risky models (see 2.2.3) also increases adolescents' intentions to be risky (e.g., smoking, Wiiums, Breivik, & Wold, 2006). Young female novices who reported greater intentions to speed also reported more advantages and fewer disadvantages, whilst young male novice drivers who reported greater intentions to speed reported more advantages, for this risky behaviour (Horvath, Lewis, & Watson, 2012). Further, speeding in a scenario-based study was predicted by emotionally-rewarding factors, making the journey more enjoyable, for drivers who intended to speed in the future (Forward, 2009).

Much adolescent health risk behaviour appears to be as a consequence of adolescents being open to opportunities to be less safe (Gerrard, Gibbons, & Gano, 2003; Ouellette, Gerrard, Gibbons, & Reis-Bergan, 1999). Adolescents do not appear to engage in rational consideration and evaluation of the negative consequences of risky behaviour, such as crashes whilst speeding; nor are young driver crashes and offences due to a lack of knowledge about the dangers of risky driving (Gibbons & Gerrard, 1995). Rather, adolescents demonstrate a *willingness* to be risky. This is particularly the case in the presence of peers, which is characteristic of adolescent behaviour (Gerrard et al., 2003), including within the driving context. To illustrate, adolescents' driving after drinking and travelling as a passenger of a drinking driver has been explained by a willingness to be a risky driver and willingness to be a passenger of a risky driver (Vegega & Klitzner, 1989).

2.2.1.4 Summary: Driver characteristics

It can be seen that a multitude of driver characteristics are influential in and associated with the crash involvement and fatalities of young novice drivers ranging from fixed variables such as gender, to modifiable attributes such as psychological distress. Whilst driver characteristics have been reviewed, there is a need for further research into the nature and role of these influences. It is also noteworthy the influence of these variables cannot always be easily identified in crash analyses nor traffic offence records, therefore the preponderance of research examining the influence of driver characteristics relies upon qualitative and quantitative self-report methodologies (see also 3.3.1).

2.2.2 Passenger characteristics

Passengers increase the crash risk for all young drivers, regardless of the licence type held (Lam, 2003a), with control vehicles detained at crash sites revealing young passengers increase the likelihood of crash in the order of five times (Lam, Norton, Woodward, Connor, & Ameratunga, 2003). The increased risk is suggested to be primarily as a result of implicit (of which the passenger may be unaware) or explicit (that is, deliberate) encouragement of risky driving (Doherty et al., 1998; Regan & Mitsopoulous, 2001; Simons-Morton, Lerner, & Singer, 2005), and distraction (Heck & Carlos, 2008; Preusser, Ferguson, & Williams, 1998). Young novice drivers are more likely to be carrying passengers than older drivers (Engstrom, 2003; Lam et al., 2003), and are more likely to be involved in single-vehicle crashes (Lee & Abdel-Aty, 2008; Padlo, Aultman-Hall, & Stamatiadis, 2005). Further, research in the United States using fatality data found that 16 year old intermediate drivers accounted for nearly five times more young passenger deaths than 18-19 year old drivers per mile driven (Williams & Wells, 1995). Passenger characteristics associated with young driver crashes include the age, gender, and number of passengers carried by the young driver.

2.2.2.1 Age of passengers

The age of passengers and their relationship to the young driver clearly influences the likelihood of young drivers crashing (Evans, 1991). Adults aged over 25 years are absent in more than 80% of young driver crashes (Miller et al., 1998). Over half of fatal crashes of 16-year-old drivers involve young passengers, more than 10 times the rate when carrying older passengers only (Ulmer, Williams, & Preusser, 1997). Young drivers are particularly susceptible to negative passenger influences (Williams et al., 2007), in contrast to older drivers who experience negligible or positive influences. As depicted in Figure 2.3, carrying two or more passengers, particularly similar-age passengers, considerably increases the odds of a driver aged less than 25 years being involved in a car crash causing injury (Lam et al., 2003).

2.2.2.2 Gender of passengers

The gender of young passengers and the young driver interacts, and young male drivers carrying young male passengers is the most risky combination for fatal crash involvement (Fu & Wilmot, 2008); young males driving in fatal crashes in America

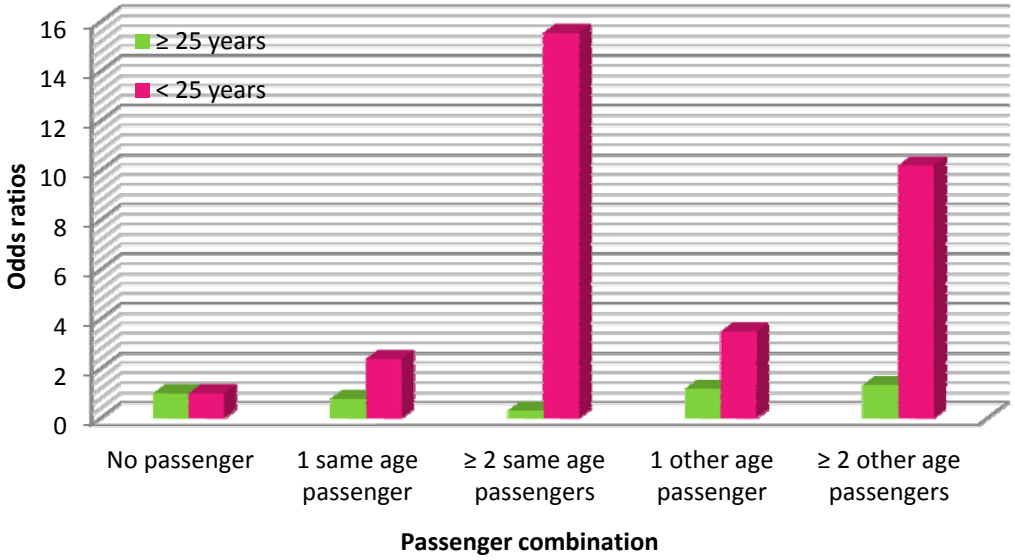


Figure 2.3 Odds ratios for car crash injury by passenger carriage (adjusted for gender, night-time driving, alcohol, exposure, and fatigue)

Adapted from "Passenger Carriage and Car Crash Injury: a Comparison Between Younger and Older Drivers," by L. T. Lam, R. Norton, M. Woodward, J. Connor, and S. Ameratunga, 2003, *Accident Analysis and Prevention, 35*, p. 865.

in 1993 in which 84% of male and 59% of female young passengers were fatally-injured (Williams & Wells, 1995). Male teen drivers leaving a high school in America were observed to closely follow the leading car and speed when carrying a young male passenger, behaviours which were less likely if they carried a female passenger (Simons-Morton et al., 2005). Three out of seven male and 1 in 4 female passengers killed in Australia in 2004 were aged 17-25 years (ATSB, 2004a). Sixty-one percent of teen passengers fatally-injured in the United States in 2007 were passengers of a teen driver (McCartt, 2009). Whilst young passengers may also be carried by older drivers, young passengers and young drivers of both genders alike experience the highest rates of death of all ages, as illustrated in Figure 2.4.

2.2.2.3 Number of passengers

In comparison to a baseline of carrying no passengers, young drivers carrying young passengers corresponds to substantially greater crash risk (Padlo et al., 2005). For example, carrying two or more young passengers increases crash risks in the order of 16 times, while other passenger combinations increase the risk by 10 times (Lam et al., 2003c). In Queensland in the five years to 31 December 2010, young novice drivers carried one or more passengers in 50.6% of all fatal crashes and in 40.0% of

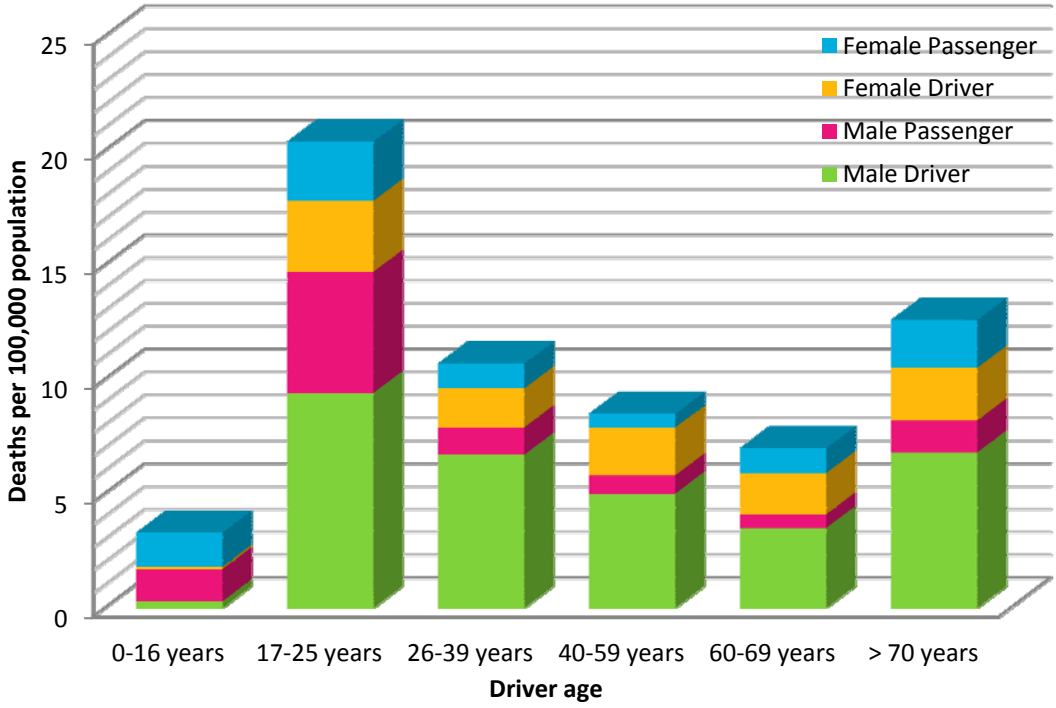


Figure 2.4 Deaths per 100,000 population by driver age group and vehicle occupant role, Australia, 2009

Adapted from Department of Infrastructure, Transport, Regional Development and Local Government, 2009, *Road Deaths Australia 2009 Statistical Summary,* DITRDLG: Canberra, pp 25-26.

all crashes resulting in a hospitalisation (DTMR, 2011c). Young drivers, particularly males, appear to be susceptible to potentially negative psychosocial influences such as refining their social identity and meeting group expectations when carrying passengers (Ulleberg, 2004; Williams et al., 2007). A multiplicative relationship in crash risk has been found when young drivers also drink alcohol, approximating 34 times the risk of crash when carrying two or more passengers compared to older drivers carrying one passenger. A New Zealand study concluding the number of passengers was the most significant predictor of young driver crashes after controlling for gender, BAC, mileage, fatigue, and time of day (Keall et al., 2004).

2.2.2.4 Summary: Passenger characteristics

As can be seen from the literature review, the age, gender and number of passengers carried by the young novice driver is influential in their crash involvement and associated fatalities. Again the nature and mechanisms of influence of passengers cannot always be determined from crash and offence analyses, and accordingly

research examining the influence of passenger characteristics also uses qualitative and quantitative self-report methodologies (see 3.3.1).

2.2.3 Social influences

As noted earlier, central to the program of the research is that the young novice driver is also an adolescent and this has considerable implications for safe road use (Gregersen & Bjurulf, 1996). Essentially, the young novice driver is still developing their personal identities and learning appropriate 'adult' attitudes and behaviours through experiences, emulation, and experimentation (Bonino et al., 2003). The adolescent is raised in a social environment in which they are exposed to the attitudes and behaviours of their parent(s), and as they mature the adolescent is also exposed to the attitudes and behaviours of others such as older siblings, peers and friends. This exposure can have considerable influence upon the risky behaviour of the adolescent, particularly when they internalise the attitudes (e.g., perceived parental approval of drinking corresponds to more drinking by adolescents, Foley, Altman, Durant, & Wolfson, 2004) and emulate the behaviours and attitudes of these models (Andrews, Hops, & Duncan, 1997; Lahatte & Le Pape, 2008; Sheehan, Siskind, & Greenslade, 2002).

2.2.3.1 Parents

Parents can and do reward and punish the attitudes and behaviours of the adolescent (e.g., Bonino et al., 2005), and this also influences the risky behaviour of their young novice. As discussed in 2.2.1.2.3, behaviours that are punished and not rewarded are less likely to be repeated, whilst behaviours that are rewarded and not punished are more likely to be repeated. For the young novice, if parents do not punish risky behaviour, such as the Learner intentionally speeding whilst under their supervision (Foss, 2007), the young novice is likely to continue speeding when they have a Provisional licence if it is rewarding (such as a 'fun' journey) for them. If parents exhibit risky driving attitudes, such as overt criticism of on-road Police enforcement activities as 'revenue-raising', the young novice internalises these attitudes and is likely to dismiss the safety benefits of road rule compliance. Further, if the young novice believes others, such as parents and friends, would approve of speeding, they are more likely to report speeding (Fleiter, Watson, Lennon, & Lewis, 2006).

The risky driving of the young novice is also associated with their parents' risky driving (e.g., Brookland, Begg, Langley, & Ameratunga, 2009; Catchpole & Styles, 2005; Chen et al., 2008; Fleiter, Lennon, & Watson, 2010; Prato, Lotan, & Toledo, 2009; Wilson, Meckle, Wiggins, & Cooper, 2006), and the driving behaviour of same-sex parents in particular (Taubman-Ben-Ari, Mikulincer, & Gillath, 2005). Parents' risky driving has been found to predict the risky driving of their children, after controlling for the influence of sociodemographic and exposure factors (Bianchi & Summala, 2004). Crash and offence patterns of parents are also repeated by their young novice children: children of parents who were involved in three or more crashes were found to be 22% more likely than other children to have crashed their car, and children of parents who had three or more offences were 38% more likely to have one or more offence than other children (Ferguson, Williams, Chapline, Reinfurt, & De Leonardis, 2001).

2.2.3.2 Peers

As noted in 2.2.3, the adolescent increases their reliance on peers – and their friends in particular – in forming attitudes and behaviours (Sharpley, 2003; Sigelman, 1999). Peers can be a model to be imitated, can encourage risky – and discourage safe – driving, and can reward and punish the young novice's attitudes and behaviours. Adolescents engage in risky behaviour as they desire social approval from their peers (e.g., see Bonino et al., 2003), and this is also rewarding for the young novice driver. As also noted in 2.2.1.1.1, young novice drivers are vulnerable to the negative influences of their peers and are susceptible to a need for social approval from these peers (Arnett, 2002), engaging in risky behaviours which are subsequently further reinforced by intergroup jocularity (Buckley, 2005; Rhodes et al., 2005; Williams et al., 2007). Male drivers in particular report greater pressure, and more discomfort in refusing, to engage in risky behaviours (Suls & Green, 2003). Adolescents who are more vulnerable to the negative influences of peers report greater influence of peers (Miller, 2010), particularly if they are experiencing depression (Allen, Porter, & McFarland, 2006).

Much risky driving is impacted upon by the social context in which it occurs – indeed, young novices cannot 'show off' unless there is someone to 'show off' to (Harre, Brandt, & Houkamau, 2004). Moreover, as noted in 2.2.4.1, young novices also use their car for social purposes (Arnett, 2002; Harrison, Triggs, & Pronk,

1999), and psychologically- and physiologically-salient (Cameron, 1999) group-approved behaviour can, and is expected, to occur (Harre, Brandt, & Dawe, 2000). Young novice drivers also report their friends explicitly encourage them to drive in a risky manner (Buckley, 2005), including speeding (CHOP, 2007, 2009). Males especially report their friends want them to be risky driviers, making journeys 'more enjoyable', whether they explicitly state this or not (Regan & Mitsopoulos, 2001).

Adolescents deliberately engage in risky behaviour such as smoking (Stewart-Knox et al., 2005) to 'fit in' and please their friends (Allen & Brown, 2008), and these adolescents also select friends who smoke (Simons-Morton, 2007a). Extending these findings, risky drivers may select other risky drivers as friends, and an escalation in riskiness may result. Further, whilst young novice drivers carry their friends as their passengers more often than older drivers, "even when we are alone, we are carrying the views of others with us…." (O'Connell, 2002, p. 214). Therefore, expectations and norms of peers can influence the behaviour of the young novice driver not only when they are travelling as passengers (Regan & Mitsopoulos, 2001), they can also influence the behaviour of the young novice who is driving *without* any peer passengers. In addition to changing social roles (Jessor et al., 1997, the consideration of which is beyond the scope of the research program), and cognitive and physiological maturation, decreasing vulnerability to the negative influence of peers (Engstrom, 2003) may explain the considerable reduction in risks to the young novice when they reach 25 years of age.

Interestingly, young *female* drivers who reported they intended to speed believed *male* friends would support this behaviour whilst *female* friends would disapprove, and *males* who reported greater speeding intentions believed *male* friends would be supportive (Horvath et al., 2012). Moreover, a critical part of adolescent psychosocial maturation is the development of mature relationships amongst peers of both genders, and intimate relationships with partners in particular can prepare the adolescent for marriage (Bonino et al., 2005). Intimate relationships can also influence the risky driving behaviour of the young novice (Shope, 2006), however the nature and dynamics of this influence requires further exploration.

2.2.3.3 Other young drivers

The risky behaviour of other young novice drivers can also influence the driving of the young novice if they perceive that behaviour favourably. The other drivers act as

a form of *prototype* – a positive image that is a socially-sanctioned model to imitate (Beullens & Van den Bulck, 2008). As noted in 2.2.3, parents and peers are pivotal in adolescent risky behaviour. Part of this influence includes the development and internalisation of prototypes regarding risky behaviours such as smoking and drinking alcohol. If a young novice internalises their own prototype, of a person who engages in risky driving, the more favourably the novice will view risky driving in general, and their own risky driving specifically. Moreover, the young novice will be more willing to drive in a risky manner if the circumstances to do so arise (Ouellette et al., 1999). Exposure of adolescents to attractive images of others also influences their behaviour, for example, desirable people in popular media drinking alcohol has been found to influence their risky alcohol consumption.

The influence of parents, peers and other young drivers appears to interact. Other young novice drivers are important in prototype development, and the peer network is most predictive of positive prototypes towards cigarette and alcohol consumption. Parents have also been found to be indirectly instrumental in risky prototype development by influencing the selection of friends by the adolescent; and directly instrumental, with adolescents holding less favourable images towards smoking if their parents also smoked (Blanton, Gibbons, Gerrard, Conger, & Smith, 1997). Prototypes also predict changes in risky driving behaviour, such that young drivers who report more risky behaviour report more favourable prototypes which can be informed by the behaviour of other young novices, their parents and their friends. In addition, risky driving behaviour predicts changes in prototypes, with risky young drivers reporting increasingly risky, and non-risky drivers reporting increasingly non-risky, prototypes over time. At all times, however, male tertiary students report significantly more risky prototypes than females (Gibbons & Gerrard, 1995).

Prototypes also have been found to contribute to adolescent expectancies of regarding risky behaviour such as excessive consumption of alcohol and to a willingness to drink to excess (Ouellette et al., 1999). Willingness and prototypes also interact: willingness to drink predicts social drinking behaviour of young adults, and interestingly this was particularly so for males who hold a negative assessment of an abstainer prototype (Zimmerman & Sieverding, 2010). There also appears to be a relationship between intentions, willingness and prototypes: recent research reporting that adolescent prototypes regarding smoking and drinking alcohol at

Times 1-4 influenced willingness and intentions at Time 5, which in turn influenced smoking and drinking alcohol by adolescents at Time 6 (Andrews, Hampson, Barckley, Gerrard, & Gibbons, 2008). Further, adolescents who reported the risky smoking and drinking behaviour of their peers was 'cool', also reported more risky prototypes, greater intentions and more willingness to drink and smoke (Spijkerman, van den Eijnden, Vitale, & Engels, 2004).

2.2.3.4 Summary: Social influences

As has been seen, social influences from parents, peers, and other young drivers can change the behaviour of the young novice driver, and the nature and role of these influences requires further investigation. Interestingly, the nature of the social relationships also appears to be important, with romantic and friendship groups exerting more influence over the behaviour of the young novice than the general peer group (Kobus, 1998). The nature of the relationships is also relevant for the parent-child dynamic: children who have a good relationship with parents were significantly more likely to imitate alcohol and marijuana use (Andrews et al., 1997); and children who have strained relationships with parents during early adolescence report more risky driving including multiple crashes (Smart & Vassallo, 2005).

2.2.4 Journey characteristics

Journey characteristics that have been found to be associated with young driver crashes and fatalities include driving purpose, driving in excess of posted speed limits, driving exposure including the time and day and day of week of the journey, and living in an urban area.

2.2.4.1 Journey purpose

Journey purpose has also been found to be influential in the risky behaviour and crash involvement of young novice drivers. As noted earlier, young novices use the vehicle for purposes other than efficient and economical travel between destinations. Of note is the use of the vehicle to meet psychosocial needs such as independence and maturation (Bonino et al., 2005), to experience excitement or to alleviate stressful feelings (Arnett et al., 1997), and often at risky times for all drivers such as at night. Young Greek drivers who did not have a planned destination were found to have an increased risk of crash involvement (Chliaoutakis et al., 1999, 2005).

2.2.4.2 Speed

Driving at higher speeds (e.g., 80-100 km/hr) is associated with greater risk of crash and fatality (Bedard, Guyatt, Stones, & Hirdes, 2002; Kanellaidis, Golias, & Zarifopoulos, 1995; Kloeden, Ponte, & McLean, 2001; Ward, Shepherd, Robertson, & Thomas, 2005). Young novice drivers frequently report travelling in excess of speed limits (Mitchell-Taverner, Zippano, & Goldsworthy, 2003), and this may in some cases be in response to driver emotions and listening to music (Campbell & Stradling, 2003). In addition, young novice drivers may sometimes not adjust their driving speed in response to driving hazards and traffic complexity, driving too fast for conditions such as heavy rainfall rather than over the limit per se (de Craen, Twisk, Hagenzieker, Elffers, & Brookhuis, 2008).

The youngest drivers account for the greatest proportion of speed-related crashes at all licence levels (Lam, 2003b). In Queensland in the five years to 31 December 2010, 30.2% of all fatalities arose from a young driver speed-related crash (DTMR, 2011c). Speeding is involved in one quarter of fatal crashes of young drivers who are sober (ATSB, 2004b). Male young novice drivers were determined to have been speeding in 1.5 times the number of fatal crashes as compared to females in Finland (Laapotti & Keskinen, 2004), and the speeding Learner experiences 2-3.5 times the risk of injury or fatality (Lam, 2003b). Moreover, 8% of drivers with a Provisional licence in South Australia were detected speeding during their first 12 months of independent driving, and this proportion rose to 20% after 2.5 years of independent driving (Kloeden, 2008a).

Further, American research has revealed that young novice drivers with their own vehicle or primary access to a vehicle report more frequent speeding (Klauer et al., 2011). Nearly 9 in 10 male and 8 in 10 female young drivers in Victoria reported speeding by up to 10 kilometres/ hour (km/hr), young males reporting speeding at least 10 km/hr over the limit on half their journeys, nearly a third of which were at greater than 25 km/hr over the limit. In addition, the speeding novices reported they had been very tired on at least one of these occasions (Vassallo et al., 2007).

2.2.4.3 Exposure

Driving exposure, including duration, distance, and the number of journeys, time of day and day of week of the journey have also been found to be a contributing factor in young driver crashes. Novices with a Provisional licence undertake significantly

more driving than when they were Learner drivers. Greater exposure is associated with increased crash risk. Young drivers who are employed and have primary access to a vehicle (including owning their car) report and are observed to have greater driving exposure measured as duration, distance and number of journeys (Ehsani, Bingham, Shope, Sunbury, & Kweon, 2010). In addition, young drivers accrue more mileage at night than older drivers (Klauer et al., 2011) and young male drivers report more hours driving and more exposure at night (Prato et al., 2010).

2.2.4.3.1 Time of day

Young drivers are at increased risk of crashing at night (Lam, 2003b; Padlo et al., 2005; Williams & Wells, 1995), due not only to reduced visibility at night but also to other factors (Clarke et al., 2006) such as carrying passengers after drinking alcohol. Crashes at night also tend to be more severe. Male drivers aged 17-20 years experience 17 times the risk of being involved in a fatal crash between 2:00am and 5:00am compared with older drivers (Ward et al., 2005). In Queensland in the five years to 31 December 2010, crashes in darkness accounted for 55.6% of all fatalities and 52.2% of all hospitalisations of young drivers (DTMR, 2011c). Nationally in 2007, 60% of drivers aged less than 26 years were killed between 6:00pm and 6:00am, compared to 40% of drivers over 26 years (DITRDLG, 2008).

2.2.4.3.2 Day of week

Young drivers are more likely to be involved in crashes on Friday, Saturday, and Sunday (Ward et al., 2005). Across Australia in 2007, half of all deaths of young drivers occurred between 6:00pm Friday and 6:00am Monday, compared to one third of older drivers (DITRDLG, 2008). Crashes at these times and on these days also tend to be more severe, resulting in 52% of fatalities and 44% of hospitalisations for all road users in Queensland in 2003 (Queensland Transport, 2005a). In Queensland in the five years to 31 December 2010, 41.2% of all fatalities from a crash involving a young driver occurred on a Saturday or Sunday (DTMR, 2011c). Young drivers are more likely to carry young passengers at night and on weekends, and greater temporal crash risk, predisposition to risky driving, and limited driving experience (Doherty et al., 1998), are further impacted upon by fatigue, drink driving, and recreational driving (Williams, 2003).

2.2.4.4 Summary: Journey characteristics

As has been seen, driving speed, and exposure including the time of day, day of the week, and proportion of driving in urban and rural areas are pivotal in young driver crash involvement and fatalities. Consistent with the difficulties experienced in measuring driver, passenger, and social influence variables, accurately determining the contribution of journey characteristics such as driving exposure can prove difficult and requires further examination.

2.2.5 Vehicle and crash characteristics

Vehicle characteristics that have been found to be associated with young driver crash and fatality rates include the type of crash, the size, age and ownership of the vehicle, and the number of vehicles in the crash.

2.2.5.1 Type and severity of crash

Young drivers are more likely to crash into the vehicle in front and crash when crossing traffic flow (Clarke et al., 2006), and hospitalisation crashes are most commonly angular crashes (Green, 2000). In Queensland in the five years to 31 December 2010, 38% of fatal crashes involving young drivers involved 'hit object', 18.3% were angular crashes, and 16.8% of crashes were head-on (DTMR, 2011c) including crashes during overtaking (Kirk & Stamatiadis, 2001). In addition, the risk of injury and fatality increases by 50% for the young novice driving on roadways with particular features such as narrowing, steep inclines and curves (Lam, 2003b). Young novice drivers are more likely to be involved in more severe (Ward et al., 2005) and single-vehicle crashes when carrying their friends as their passengers (Aldridge, Himmler, Aultmann-Hall, & Stamatiadis, 1999; Padlo et al., 2005). Loss-of-control crashes are twice as likely for male as female young drivers, and are three times more likely to be fatal (Tavris, Kuhn, & Layde, 2001). As the number of young passengers increase, fatal crash involvement rates of the youngest drivers in particular increase as depicted in Figure 2.5. As can be seen, injury and fatality rates more than double for drivers aged 16-19 years when passengers are present, with all young male crash rates exceeding females with and without passengers (Doherty et al., 1998).

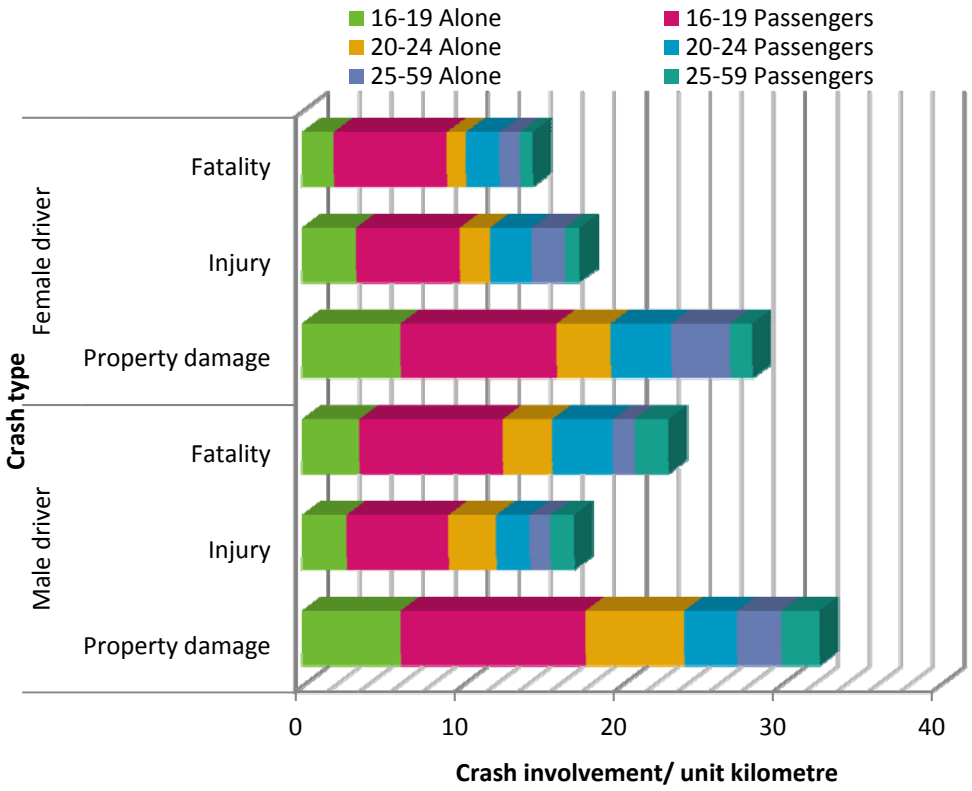


Figure 2.5 Crash involvement rate per unit kilometre by driver age, gender and passengers, and type of crash, Ontario Canada, 1988

Note. *Property Damage* and *Injury* crash involvements are per million kilometres driven, *Fatality* involvements are per 100 million kilometres driven. From "The Situational Risks of Young Drivers: The Influence of Passengers, Time of Day and Day of Week on Accident Rates," by S. T. Doherty, J. C. Andrey, and C. MacGregor, 1998, *Accident Analysis and Prevention, 30*, p. 49.

2.2.5.2 Size, age, and ownership of vehicle

Young novice drivers alike are at substantially higher risk of being injured and killed in passenger cars and four wheel drive vehicles such as sport utility vehicles irrespective of whether the vehicle rolls or not (Kweon & Kockelman, 2003). Young drivers are more likely to travel in smaller, older cars, particularly those young drivers who 'own' their vehicle (Cammisa, Williams, & Leaf, 1999), and such cars are involved in nearly five times as many young driver crashes as larger cars (Williams & Wells, 1995). These cars offer less crash-avoidance mechanisms (e.g., electronic stability control) and crash-protective measures (e.g., air bags) (Ferguson, 2003). A five-year increase in the model year of the car driven has been found to correspond to a 5% increase in the odds the young driver will be fatally injured (Bedard et al., 2002). The choice of car by females places them at even greater risk (28% greater risk of death or injury compared to 13% for males) (RAC, 2009).

Research consistently demonstrates that most young novices have primary access to a vehicle (Garcia-Espana, Ginsburg, Durbin, Elliott, & Winston, 2009), and young novices who own their own vehicle also report greater driving exposure, more risky driving, greater crash involvement (Cammisa et al., 1999) and more driving violations (Williams, Leaf, Simons-Morton, & Hartos, 2006). Parents are pivotal in novice car ownership (Smart & Vassallo, 2005). Perplexingly, when parents were asked in a US study by Hellinga, McCartt, and Haire (2007) about the type of car they were purchasing for their child, safety concerns for their young driver featured prominently in their decision-making, and they were aware what constitutes the desirable safety features of a car, yet they intended buying a smaller, cheaper car for the young novice driver that was unlikely to have these safety features. Young male drivers in the United States reported the five key features that they wanted in their vehicle as '(1) performance, (2) looks, (3) sound system, (4) modifiable, (5) coupe' (Kellerman, 2008), and British young drivers with performance cars report more risky driving in general and at night in particular (Clarke et al., 2006).

2.2.5.3 Number of vehicles in the crash

Young novice drivers persistently are overrepresented in single-vehicle crashes (Catchpole, Cairney, & Macdonald, 1994; Ehsani & Bingham, 2011). In Queensland in 2003, fatal young driver crashes predominantly involved single vehicles (Queensland Transport, 2005a). In 2006 in Victoria, 66% of young driver fatalities resulted from single vehicle crashes (TAC, 2007). These crashes are characterised by higher injury rates (General Accounting Office, 1995). Crashes in rural areas are also more likely to be single vehicle (Chen et al., 2009; Peek-Asa et al., 2010).

2.2.5.4 Summary: Vehicle and crash characteristics

As has been seen, the vehicle and crash characteristics of type and severity of crash, size, age, and ownership of a vehicle, and the number of vehicles in the road crash are influential in the crash and fatalities of young novice drivers.

2.2.6 Summary: Contributing variables in young driver crashes

Thus far, Chapter Two has reviewed the literature regarding the contributing variables in young driver crashes. It is apparent that a multitude of influences, whilst reviewed as individual factors, can and do interact to place the young novice driver

at considerably increased risk of injury in a road crash. As a consequence, a multitude of young novice driver road safety countermeasures have been applied to ameliorate this pervasive problem.

2.3 Young driver road safety countermeasures

The significantly higher crash and fatality rates of young novice drivers around the world has prompted the development and implementation of a variety of countermeasures designed to ameliorate and manage risky driving behaviour. Such countermeasures align with the 'pre-crash phase' of the Haddon matrix (Runyan, 2008) as illustrated in Table 2.1.

Table 2.1 Haddon matrix depicting the variety of countermeasures targeting the risky behaviour of young novice drivers

	Human/ Host	Agent/ Vehicle	Physical Environment	Socioeconomic Environment
Pre-Event	Driver training and education Policing programs and sanctions	In-car technology (including seat belts)		Media campaigns Incentive programs Peer-support programs Parent support programs Medical professionals Graduated driver licensing programs
Event				
Post-Event	Rehabilitation, remediation and retraining programs			

Countermeasures such as driver training and education, rehabilitation, remediation and retraining programs, in-car technology, media campaigns, incentive programs, peer and parent support programs, medical professionals, legislation and enforcement have been applied in various formats in motorised jurisdictions throughout the world with varying degrees of impact upon the behaviour and crash and involvement of young novice drivers. However, their role in reducing the risky behaviour and increased crash involvement of young novice drivers is not central to the scope of the research program. As such, a brief literature review regarding each of these interventions is provided for the reader in Appendix A. In contrast, graduated driver licensing programs – which can be understood as a type of risk

management system which applies to all novice drivers – *are* central to the program of research, thus this countermeasure is reviewed below.

2.3.1 Graduated driver licensing

Young novice drivers quickly acquire vehicle control skills. In contrast, learning to safely drive amongst traffic, regulating driving behaviour whilst interacting with the surrounding traffic, requires much driving practice over an extended period (Deery, 1999; Foss, 2007; Hedlund, 2007). There is a growing body of evidence confirming the effectiveness of graduated driver licensing (GDL) (Hartling, Wiebe, Russell, Petruk, Spinola, & Klassen, 2009), which acts as a form of exposure control and risk management by allowing novice drivers to gain more experience under more supervision over an extended duration in lower-risk driving circumstances (Williams & Ferguson, 2002; Senserrick & Haworth, 2005). New Zealand was the first country to adopt a GDL program in 1984, and many jurisdictions in Europe (Baughan & Simpson, 2002), the United States (Keating, 2007; Preusser & Tison, 2007), and Australia (Senserrick, 2009) have implemented similar multi-phase licensing systems. These programs vary widely, however they typically incorporate a degree of passenger and night-time driving restriction (Hedlund, 2007) and required amounts of practise during the Learner period (McKnight & Peck, 2003).

Evaluations have been conducted in New Zealand (e.g., Begg & Stephenson, 2003; Begg, Stephenson, Alsop, & Langley, 2001; Lewis-Evans, 2010; Lewis-Evans & Lukkien, 2007), the United States and Canada (Fell, Jones, Romano, & Voas, 2011; Mayhew, Simpson, Singhal, & Desmond, 2006; Shope, 2007; Shope & Molnar, 2003; Vanlaar et al., 2009). Most evaluations have shown mixed but generally favourable results (Ferguson, Teoh, & McCartt, 2007; Rice, Peek-Asa, & Kraus, 2004; Shope & Molnar, 2003; Twisk & Stacey, 2007), with studies reporting some improvements in young driver road safety (e.g., Cooper, Atkins, & Gillen, 2005; Rice et al., 2004), a handful of early studies citing no reductions in young driver crashes or fatalities (e.g., Masten & Hagge, 2004), particularly for older novice drivers (Keating, 2007), and no differences in crashes or fatalities between states with formal GDL versus states without formal GDL programs (e.g., Hartos et al., 2005). Since this time a number of GDL programs have been enhanced, however, and programs with night-driving and passenger restrictions (Morrisey, Grabowski,

Dee, & Campbell, 2006), and a minimum Learner duration, which therefore increases the age at which independent driving can begin, appear to be the most effective (McCartt, Teoh, Fields, Braitman, & Hellinga, 2010; Preusser & Tison, 2007; Williams, 2007). Therefore reducing the young novice driver's exposure to risky driving conditions seems to be the main strength of GDL (Karaca-Mandic & Ridgeway, 2010). It is noteworthy that some increased crash risk for 18 year old novices has been found in GDL programs in the United States where novices can drive independently aged as young as 16 years, and this requires further exploration to understand the mechanisms involved (Masten, Foss & Marshall, 2011).

In addition, requiring a violation-free driving record to progress to the next stage of the GDL permit has also been associated with reduced crash and offence rates (McKnight & Peck, 2003). Research findings thus far suggest that GDL programs need to be continually evaluated and enhanced using empirically-based restrictions and requirements (Begg, Brookland, Hope, Langley, & Broughton, 2003; Hedlund, 2007; Keating, 2007). The structure of licensing programs also influences the training and behaviour of Learner drivers, with considerable differences found in the experiences of Learner drivers in two neighbouring Australian states (New South Wales and Queensland, Bates et al., 2010b).

Compliance with GDL program requirements and restrictions is fundamental (Goodwin & Foss, 2004). GDL requires the support of the young novice driver, their parents and the Police (Williams & Mayhew, 2008). Unfortunately young drivers have reported high rates of non-compliance with GDL conditions (Harre et al., 1996; Masten & Hagge, 2004), and intervention programs encouraging compliance have achieved only moderate improvements (Goodwin, Wells, Foss, & Williams, 2006). Passenger restrictions in particular commonly are violated (Kim, Anton, & Shearer, 2008; Williams et al., 2007), with 80% of Californian teens reporting violating passenger restrictions whilst Police report a lack of GDL enforcement programs (Rice et al., 2004). This is disappointing as Police enforcement programs have consistently been demonstrated to result in reductions in crashes and fatalities (e.g., Yannis et al., 2007). Moreover, young drivers report that when they have been detected breaking GDL rules, they usually received a warning rather than an infringement notice (Rhodes, Brown, & Edison, 2005). Some jurisdictions have introduced additional legislation to strengthen the existing GDL (Traffic Tech,

2007), an acceptable and effective alternative to directly modifying the existing GDL program (Williams, 2011).

Many GDL programs rely upon parents enforcing restrictions (Simons-Morton, 2007b; Williams et al., 2006). Not only do parents require the additional support of Police enforcement (Senserrick & Haworth, 2005; Williams & Mayhew, 2008) parents also rely upon the GDL program to impose driving conditions for their young novice (Beck, Shattuck, Raleigh, & Hartos, 2003; Foss & Goodwin, 2003). Parents impose and enforce more driving rules based on the state-legislated GDL than parents in non-GDL states (Beck et al., 2003; Hartos et al., 2005). Furthermore, parents are generally supportive of GDL requirements (Waller, Olk, & Shope, 2000), including night driving curfews (Williams, Braitman, & McCartt, 2011; Williams, Nelson, & Leaf, 2002; Williams & Preusser, 1997). Further, parents can help shape novice attitudes towards GDL, which is important as young novice drivers who report negative attitudes towards GDL restrictions report more risky driving and crashes (Brookland & Begg, 2011).

2.3.1.1 Graduated driver licensing in Queensland

Every state and territory in Australia has their own version of GDL (Senserrick, 2009). The research program is undertaken within the framework of the GDL program in Queensland, therefore the GDL program will now be reviewed. In July 2007, Queensland introduced a new GDL program (Queensland Transport, 2007a, b) after consultation with the wider community including young novice drivers, their parents, professional driving instructors (Queensland Transport, 2005b; Solomon, King, & Moore, 2006), motoring and road safety organisations. Table 2.2 depicts the GDL stages, assessments, requirements and restrictions of the enhanced- and former-GDL programs. The current-GDL program now requires Learners to record 100 hours in a logbook, and 10 of these hours must be accrued through driving at night. In addition, novice drivers, supervisors and passengers alike must not use a mobile on any loudspeaker function during the journey. Key changes to the Provisional phase include a multi-stage Provisional period and hazard perception test (Wetton, Hill, & Horswill, 2011).

Practical driving assessments (PDA) have some influence upon the actual driving practice of the Learner (McDougall, 2009), and around the world in recent times PDA continue to be examined for potential improvements (Sturzbecher,

Table 2.2 Queensland Graduated Driver Licensing Rules, Pre and Post July 2007, for Young Novice Drivers

Pre July 2007 (Former GDL program)	Post July 2007 (Enhanced GDL program)
Learner Theory Test	***Learner Theory Test***
Learner Licence • Minimum Age 16 years 6 months • Must be held for 6 months minimum • Can accumulate 4 demerit points • Zero alcohol limit if under 25 years • Must display L plates • Must carry licence at all times while driving • Must drive under the direction of a person who holds, and has held, an open licence for that class of vehicle for at least 12 months	**Learner Licence** • Minimum Age 16 years • Must be held for 12 months minimum • Can accumulate 4 demerit points • Zero alcohol limit • Must display L plates • Must carry licence at all times while driving • Must drive under the direction of a person who holds, and has held, an open licence for that class of vehicle for at least 12 months • Must gain 100 hours of certified, supervised driving experience, recorded and certified in a logbook and including 10 hours of night driving experience • Must not use mobile phones, including hands-free, blue-tooth accessories, and loud-speaker functions, while driving • No passengers can use mobile on loudspeaker function
Q-Safe Practical Driving Assessment	***Q-Safe Practical Driving Assessment***
Provisional Licence • Minimum age 17 years • Must be held: 3 years if driver aged under 23 years; 2 years if driver aged 23 – 24 years; 1 year if driver aged 24 or over • Can accumulate 4 demerit points • Zero alcohol limit if under 25 years • Must carry licence at all times while driving • Limited to driving an automatic vehicle if tested in an automatic vehicle	**Provisional Licence P1** • Minimum age 17 years • Must be held for a minimum of twelve months • Must display red P plates • Must not accumulate more than 4 demerit points in a one-year period • Zero alcohol limit • Must carry licence at all times while driving • Limited to driving an automatic vehicle if tested in an automatic vehicle • Can carry only one passenger aged under 21 years between 11pm and 5am (excluding immediate family members) • Must comply with high-powered vehicle restrictions

Pre July 2007 (Former GDL program)	Post July 2007 (Enhanced GDL program)
	Provisional Licence P1 cont • Must not use mobile phones, including hands-free, blue-tooth accessories, and loud-speaker functions, while driving • No passengers can use mobile on loudspeaker function • Must complete a hazard perception test requiring identification of potential traffic conflicts upon video that would require driver action to progress from P1 to P2
	Hazard Perception Test
	Provisional Licence P2 • Minimum age 18 years • Must be held for 2 years if the P1 was issued to a driver aged under 23 years and the driver is under 25; for 1 year if the P1 was issued to a driver aged under 23 years and the driver is now 25 or older or if the P1 was issued to a 23 year old driver and the driver is now aged 24 years or older • Can accumulate 4 demerit points • Zero alcohol limit • Must carry licence at all times while driving • Limited to driving an automatic vehicle if tested in an automatic vehicle • Must display green P plates • Must not use mobile phones, including hands-free, blue-tooth accessories, and loud-speaker functions, while driving • No passengers can use mobile on loudspeaker function • Must comply with high-powered vehicle restrictions
Open Licence • Minimum age 20 years • Can accumulate 12 demerit points within a three year period • Zero alcohol limit for heavy vehicle drivers • Alcohol limit of .05% for all others • Limited to driving automatic vehicle if tested in automatic vehicle	**Open Licence** • Minimum age 20 years • Can accumulate 12 demerit points within a three year period • Zero alcohol limit for heavy vehicle, taxi, and tow truck drivers • Alcohol limit of .05% for all others • Limited to driving an automatic vehicle if tested in automatic vehicle

Bonninger, & Rudel, 2008). The PDA in Queensland is currently under review (DTMR, 2011d), and again this involves consultation with the wider community and motoring organisations. It is noteworthy that GDL programs do not specifically address the risky driving behaviour of the young novice (Williams, 2008), rather they focus on journey characteristics, and there is no consensus within the literature regarding the optimal mechanisms of learning to drive (Foss, 2007). Rather, whilst information regarding risks and suggested driving practice are made available to the young novice driver and their parent (Queensland Transport, 2007b, c), parents are relied upon to provide most of the training and education at their discretion (Williams & Mayhew, 2008). Furthermore, GDL programs may incorporate requirements that are difficult for marginalised novice drivers and their parents to comply with (Langley et al., 2012). To illustrate, indigenous Australian young novice drivers (Somssich, 2009), and young novice drivers who have left home at a young age or for whom the family does not own a car experience extreme difficulty complying with the 100 logbook hours' requirement. Accordingly, a handful of mentor programs of various forms have been developed (Youthsafe, 2009) and further programs may be needed.

Interestingly, Queensland's enhanced-GDL program allows additional credit for undertaking practice with a professional driving instructor, with the first 10 hours of professional instruction equivalent to 30 hours of logbook credit. Whilst the benefits of professional instruction over lay instruction have not been demonstrated, differences in lesson focus and communication regarding driving risk have been found (Tronsmoen, 2011). The Learner phase is the safest period for the young novice driver (see 2.2.1.3.1). However what is not known is how to transfer the safe influence of the supervised driving period to the independent driving period, and how to make the Learner phase as beneficial as possible (Catchpole & Stephenson, 2001; Christmas, 2007; Emmerson, 2008; Foss, 2007; Goodwin, Foss, Margolis, & Waller, 2010; Groeger & Banks, 2007; Gregersen, Nyberg, & Berg, 2003). Further, recent Australian research suggests there is a relationship between the driving behaviours of the Learner's supervisor and the novice's subsequent driving on a Provisional licence, with young novices approximately 35% more likely to crash if their supervisor had recent traffic offence convictions (Senserrick, Boufgous, Ivers, Stenson, Norton, & Williamson, 2010).

It is apparent in the literature review that young, and therefore less-experienced, drivers are involved in more crashes and fatalities arising from those crashes, than older, more experienced drivers. Within a GDL program, the young driver typically becomes fully licensed at an older age through the extended GDL intervals (Williams, 2006a), and the young driver gains more driving experience through meeting the requirements of a logbook in the first phase of driving. Consequently it appears that an implicit assumption of the GDL program is that the fully licensed, 'older' young driver is at reduced risk of fatalities from crashing their car (Ferguson, 2003). In addition, another implicit assumption of GDL is that more hours of supervised driving practice will correspond to safer unsupervised driving as the young driver has been exposed to a greater number and variety of potentially risky situations. However, the optimal number of hours of supervised practice has not been identified, with the mandated hours varying widely by jurisdiction. As noted in Table 2.2, in Queensland it is now a requirement that the young learner driver obtain a minimum of 100 hours supervised driving practice over a 12 month period. This will exceed the amount of supervised driving practice reported by Learner drivers prior to the July 2007 GDL modifications, which was reported as an average of 64 hours (Bates et al., 2009a).

GDL restrictions prevent the young novice driver from driving in conditions that are particularly risky, such as carrying peer passengers at night (Williams, 2006a, b). Long-term benefits of any GDL program will not be realised, however, if young drivers do not obtain sufficient supervised experience in driving in conditions that are hazardous for *all* drivers. For example, a two-year longitudinal study of a small rural sample of Victorian learner drivers found they had only experienced 4.4 journeys at night and driven in the rain on three occasions (Harrison, 2004). Recognising this, the Queensland GDL program specifically incorporates a 10-hour minimum requirement for night-driving (Table 2.2).

2.3.2 Summary: Young driver road safety interventions

In addition to graduated driver licensing programs reviewed above, a multitude of young driver road safety interventions have been developed and implemented, which were reviewed in Appendix A. These interventions fall within the scope of engineering, education, and enforcement, targeting the young novice directly and/or indirectly through their parents and their peers. The mechanisms of

influence and/or change within each of these interventions remain to be fully understood. In addition, whilst GDL appears to be an effective countermeasure, much remains unknown about the novice driver experience with and behaviours within Queensland's enhanced-GDL program.

2.4 Research questions one, two and three

2.4.1 Research question one

The literature review has revealed the wide range of factors influencing the risky behaviour and the crashes of young novice drivers, including those related to the driver, their passenger(s), the broader social environment of parents, peers and other young drivers, their journey, the vehicle they drive and the circumstances of their road crashes. As will be seen in 3.3, this information has been gleaned through various methods, including crash reconstructions, naturalistic observations, and self-report surveys. The majority of the data regarding the behaviour of young novice drivers and reported in the literature review thus far has been obtained through police infringement records and synthesis of crash reports by the licensing authority (Department of Transport and Main Roads, formerly Queensland Transport). It is noteworthy that crashes are relatively rare events, and that many risky behaviours undertaken by the young novice driver remain undetected by enforcement authorities. Accordingly, much remains unknown about the incidence and frequency of a wide range of risky driving behaviours. Therefore research question one is "*What risky driving behaviours do young novices engage in as they progress through an enhanced GDL program?*"

2.4.2 Research question two

The literature review regarding the variety of young driver road safety countermeasures has provided some insight into the (in)ability of these counter-measures to intervene in the risky driving behaviour of young novices. As noted earlier, the research program focuses upon the countermeasure GDL. The behaviours and experiences of young novice drivers progressing through the enhanced GDL program in Queensland remains unknown, and this will be addressed by research question one. Importantly the behaviours of young novice drivers in Queensland's current-GDL program have not been compared to the behaviours of young novice drivers who progressed through Queensland's former-GDL program. Therefore

research question two is "*What impact have the changes to the GDL program in Queensland had upon the self-reported behaviours and experiences of young novice drivers?*"

2.4.3 Research question three

The review of the literature regarding driver characteristics and social influences has highlighted their association with and their potential influence in the crash involvement and the risky driving behaviour of young novices. What remains unknown, however, is the extent to which personal characteristics, such as psychological traits of sensation seeking and states such as emotional distress, influence the risky driving of the young novice; and the nature of the interrelationships between these traits and states; both concurrently and over time. Further, the influence of parents and peers upon the risky behaviour of the young novice driver, within the context of a progressive GDL program, also remains unknown. Therefore research question three is "*What are the key personal and social factors associated with the risky behaviour of young novice drivers in an enhanced GDL program?*"

2.5 Chapter summary

Chapter Two reviewed the literature regarding the contributing factors in young driver crashes, including their risky driving behaviours, and the interventions implemented to diminish the risky driving behaviour of the young novice whilst facilitating the novice in gaining on-road driving practice in reduced-risk circumstances. The first three research questions were also stated. Chapter Three will finalise the literature review for the program of research, reviewing the relevant theoretical models to identify an appropriate theoretical framework to guide the program of research. Specifically, the program of research will be guided by a theoretical framework which is positioned within Bandura's reciprocal determinism model. In addition, two further research questions will be proposed at the end of Chapter Three.

Chapter Three: Theoretical and Methodological Perspectives on Young Novice Driver Risky Behaviour

3.1 Introductory comments

Chapter Two reviewed the literature regarding the contributing factors in, and the countermeasures designed to ameliorate, young driver risky behaviour crashes. The first three research questions which related to exploring the risky driving behaviour of young novices within the context of Queensland's enhanced-GDL program, and the personal, social and structural influences upon this behaviour, were also identified.

As has been seen from the literature review of Chapter Two, an extensive range of variables are associated with increased rates of young driver crashes and fatalities (Shope, 2006). Simply making young novice drivers aware of the risks of harm through crashes which arise from risky driving behaviour is not enough to effect behaviour change (Shope & Bingham, 2008). To illustrate, the majority of young drivers report that driving after drinking is risky, however some young drivers still engage in drink driving and carrying passengers whilst they do so (TIRF, 2011). Countermeasure development has considered some of these variables, such as the current GDL program in Queensland that incorporates night-time passenger restrictions. As noted earlier, the young driver is an adolescent maturing from a child to an adult. During this time, the young driver not only becomes more mature and experienced as a driver, the young driver also matures cognitively, physiologically, behaviourally, and socially (Gullotta, Adams, & Markstrom, 2000; Keating & Halpern-Felsher, 2008; Sebald, 1992; Sprinthall & Collins, 1995; Wolfe, Jaffe, & Crooks, 2006). Maturation can have implications for risky driving behaviour (Bingham & Shope, 2004; Dahl, 2008), particularly as risk taking is normative during this developmental period (Irwin, 1993), and the young driver's behaviour has been found to be influenced by both personal and social factors (Shope & Bingham, 2008). Therefore the nature and influence of social and personal factors need to be considered further in the domain of the risky behaviour of the young novice driver (Rimmo & Aberg, 1999; Shope, 2010; Shope & Bingham, 2008).

Given the multitude of factors influencing young driver behavior, it is essential that research in the area is well-grounded, both theoretically and methodologically. Accordingly, this chapter will outline the theoretical and methodological perspectives on young driver risky behaviour which have guided the program of research. More particularly, it will overview Bandura's reciprocal determinism model (Bandura, 1977), which was adopted as the over-arching

research framework, as a means of investigating the interactive influence of the behaviour, the environment, and the individual, in the risky– including intentional and unintentional – driving behaviour of the young novice. In addition, issues related to the measurement of the behaviour, the person, and the environment will be elaborated upon, and the final two research questions will be identified.

3.2 Bandura's reciprocal determinism model

Bandura's reciprocal determinism model (RDM) emerged in the 1970s as a paradigm that explains human behaviour by not only considering the role of the individual, the environment, and their behaviour, but also the interactive influence of each of these dimensions. Rather than behaviour being a result of the person and the environment only, Bandura proposed that the behaviour, the person and the environment impact upon and therefore change in response to each other in a reciprocal relationship. As such, *behaviour* is influenced by and impacted upon, and therefore changes because of, the *person* and the *environment*; the *person* is influenced by and impacted upon, and therefore changes because of, the *behaviour* and the *environment*; and the *environment* is influenced by and impacted upon, and therefore changes because of, the *person* and the *behaviour* (Bandura, 1977). Figure 3.1 depicts this interactive relationship.

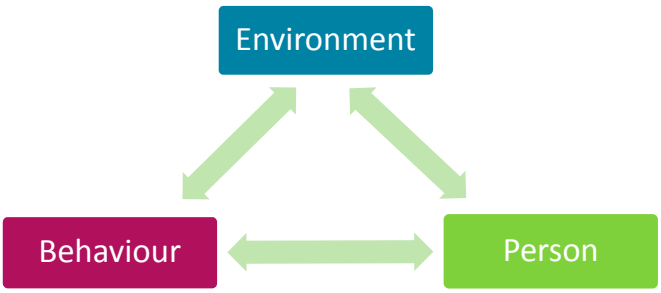


Figure 3.1 Bandura's reciprocal determinism model

Adapted from "The Self System in Reciprocal Determinism", by A. Bandura, 1978, *American Psychologist, 33*(4), p. 345.

As can be seen, the overarching model provides an interactive framework which will facilitate a comprehensive investigation of the young novice driver, their behaviours, and their environment. The dimensions of the behaviour, the person, and the environment are discussed below within the context of the young novice driver and

their risky driving behaviour, with particular attention given to the potential interactive nature of the relationship.

3.2.1 Bandura's RDM: The behaviour

Within this program of research, the *behaviour* component of Bandura's RDM will be conceptualised to include the driving behaviours of the young novice, many of which were discussed in the literature review of Chapter Two. Behaviours of relevance to the program of research include those which were performed before they were licensed to drive on the road (pre-Licence driving), and those performed when they held a valid Learner and Provisional 1 driver's licence. Whilst the majority of these behaviours can be conceptualised as intentionally risky, some of them may have been unintentionally risky. Behaviours are influenced by their consequences, such that a lack of punishment or receipt of a reward will increase the likelihood that the behaviour will be repeated, while prior behaviours can also impact upon subsequent behaviours. To illustrate, if a young novice drives in excess of speed limits, arrives early or on time to their destination, and does not crash and is not detected by Police, the young novice is likely to again drive in excess of speed limits. As stated in research questions one, two, and three, the prior and current behaviours of the young novice driver will be examined in this program of research, and this will include examining the relationships amongst behaviours in cross-sectional and longitudinal research.

3.2.2 Bandura's RDM: The person

For this program of research, the *person* component of Bandura's RDM will be conceptualised to relate to the individual young novice drivers themselves. Further to the range of sociodemographic characteristics (see 2.2.1.1, e.g., age, gender, employment status), emotion-related factors and personality (see 2.2.1.2) are of particular interest to the research program. More particularly, psychological states of anxiety and depression, and psychological traits of punishment and reward sensitivity, and sensation seeking propensity specifically will be examined. In addition to the person influencing their environment and their behaviour, they are influenced by the 'prior' person. To illustrate, the risky behaviour of the young novice driver is influenced by the sensation seeking propensity of the young novice driver, and sensation seeking propensity appears to be a relatively stable trait of the

adolescent. As before, the program of research will explore the personal characteristics of the young novice driver, as well as the interactions between these personal characteristics through both cross-sectional and longitudinal research.

3.2.3 Bandura's RDM: The environment

For the research program, the *environment* component of Bandura's RDM will be conceptualised to reflect the environment within which the young novice learns to, and then independently, drives. The environment thus comprises the *social* influences of the young novice drivers' parents, their friends, and the Police, and the *structural* influences of Queensland's enhanced-GDL program. In addition to the environment influencing the person and the behaviour, the social and structural environments also influence each other. To illustrate, the risky behaviour of the young novice driver within the enhanced-GDL program (structural environment) is influenced by the teaching and monitoring behaviour of their parents (social environment) who are typically the Learner's supervisors (Bates et al., 2009a). Once again, this program of research will not only investigate the characteristics of the environment but will explore the relationships amongst the social (parents, peers, Police) and structural (GDL) environmental influences in both cross-sectional and longitudinal research.

3.3 Operationalising the behaviour

As per Figure 3.1, behaviour is influenced by, and in turn influences, both the person and the environment (Bandura, 1977). In the context of the young novice driver in the research program, it is proposed that the personal characteristics of the young novice represent a key influence on their risky driving behaviour. This premise is fundamental to the program of research, and will be discussed further in 3.4. Moreover, the structural and social environment in which driving is undertaken also influences their behaviour. Again this premise is fundamental to the research program, and the structural (GDL) and social environment (parents, peers, Police) will be discussed further in 3.5. The literature reviewed in Chapter Two summarised the wide range of factors contributing to the crashes of young novice drivers, thereby revealing numerous risky driving behaviours performed by young novice drivers that place them at risk of death and injury from a car crash. The methodologies and methods used to measure this behaviour are reviewed below, highlighting the need to

utilise an instrument specific to measuring the risky driving of young novices.

3.3.1 Methods and methodologies

The extant research literature relating to novice driver behaviour has been informed by findings from

- focus groups and individual and small group interviews;
- questionnaires and surveys by means of telephone, paper-and-pencil, internet/online, door-to-door sampling, video and scenario displays, with open and closed questions and of varying lengths;
- studies that frequently utilise data from licensing authorities, police, insurance reports and hospital records, traffic convictions, red light and speed camera photographs, logbooks and driving diaries;
- performance tests;
- estimation of mileage;
- local, state, and national crash-reporting databases containing driving exposure, car crash, injury and fatality data;
- case-control, crash responsibility analysis, and crash reconstructions; objective measures and subjective estimates; and
- self-reported behaviour, simulated driving including closed course driving experiments, and naturalistic observations which include roadside, camera, ride-along and following test vehicles.

While all data sources have their relative strengths and weaknesses, self-report data has been criticised for being vulnerable to biases such as recall errors (which may lead to underreporting of risky driving behaviours including crash-involvement) (e.g., see Lajunen & Summala, 2003). Impression management biases may also be apparent. To illustrate, male young novice drivers who believe risky driving behaviour is normative in their social group may be more inclined to overreport engagement in risky driving behaviour (see also 2.2.1.1.1 and 2.2.3.2). However recent Australian research found very high consistency between self-reported and Police-recorded offences and crashes (Boufous et al., 2010b). In addition, much risky behaviour is not easily observed (e.g., driving whilst tired), and research suggests that social desirability influences such as impression management biases in reporting may exert only a relatively small influence upon the reporting of

risky driving via the Driver Behaviour Questionnaire (Lajunen & Summala, 2003). Moreover, research consistently demonstrates a direct link between risky driving and incurring harm through injury (e.g., Ivers et al., 2009; Turner, McClure, & Pirozzo, 2004), and self-report methods are one way to explore both risky behaviour and injury. In addition to being a cost-effective alternative, as was seen in Chapter Two, there is a relationship between non-observable variables such as personal attitudes, social influences and intentions, and risky driving behaviour (Victoir, Eertmans, Van den Bergh, & Van den Boucke, 2005), crashes and offences (Hatakka, Keskinen, Katila, & Laapotti, 1997). Therefore a self-report methodology will be used in the program of research which will utilise quantitative surveys and qualitative interviews.

Further, research examining not only the risky driving behaviour of young novices, but also the efficacy, validity and reliability of young driver road safety interventions, has utilised both cross-sectional and longitudinal approaches. Each approach is able to provide unique insight into the risky driving behaviours of young novices and the effects and efficacy of countermeasures. The cross-sectional approach will be used in the program for two purposes. First, this approach will allow an exploration of the attitudes, behaviours and experiences of young novice drivers at various times, and in particular as pre-Licence drivers, as Learners, and as drivers with a Provisional 1 licence. Second, this approach will allow a comparison of the attitudes, behaviour, and experiences of young novice drivers in the current-GDL program to the attitudes, behaviours, and experiences of young novice drivers in the former-GDL program. Data previously collected by PhD Candidate Ms Lyndel Bates as part of her PhD program of research will be used for this comparison.

A longitudinal approach will also be used in the program of research. Longitudinal research can provide insight into the nature and magnitude of (presumably) causal relationships (Menard, 2002; Ruspini, 2008), particularly the case for cohort studies in which the same individuals are followed-up over time (Tarling, 2009). Longitudinal research is especially suited to examining the attitudes, characteristics, behaviours, and experiences of young novices who are developing as drivers from an inexperienced Learner driver to an independent Provisional driver and are also developing from adolescents to adults. Therefore to ensure a comprehensive investigation of the risky driving behaviour of young novice drivers, the research program will incorporate longitudinal and cross-sectional approaches.

3.3.2 Instruments

Further complicating analyses regarding young novice driver behaviour and risk factors are the differing definitions, such as 'young drivers' (for example, 16-25, 16-20, 18-25 years, Carcary, 2002), and 'hospitalisation' (if taken to hospital in Victoria, other Australian states require admission, Green, 2000). Young novice driver crash, injury and fatality statistics also may be subject to poor or incomplete data recording (Haworth, 1994; Ulfarsson & Mannering, 2004). In addition, contributors such as fatigue may not be readily identified in crash analyses. Further, very large samples are needed to identify changes in crash and offence patterns (Hatakka et al., 1997).

Accordingly, there has been a tendency among road safety researchers to use self-report instruments to explore young novice driver behaviour, involving two main approaches. Firstly, some researchers have designed purpose-built scales to explore constructs of interest, and these scales may contain as few as two items (e.g., exploring alcohol and driving in secondary students in New Zealand, Harre et al., 1996) or as many as 35 items (e.g., the Driving Survey exploring aggressive and risky driving, Moore & Dahlen, 2008). Secondly, other researchers have utilised a standardised scale such as the Driver Behaviour Questionnaire (DBQ, Reason, Manstead, Stradling, Barker, & Campbell, 1997). The DBQ was designed to measure driver errors, lapses, aggressive violations and highway-code violations typically via 29 items which are associated with and predictive of both crashes and offences. The DBQ is one of the most common self-report driving questionnaires in use and has been applied in various driving populations around the world (e.g., China, Xie & Parker, 2002; Australia, Davey, Wishart, Freeman, & Watson, 2007).

However, the DBQ was developed using the responses of experienced, older drivers. It was not designed specifically for use with young novice drivers, and applications of the DBQ in these populations (e.g., Brazil, Bianchi & Summala, 2004; Israel, Taubman-Ben-Ari et al., 2005) appears to implicitly assume that the instrument validly and reliably measures their risky driving behaviour. This seems unlikely for three main reasons. First, many of the items in the *lapse* subscale of the DBQ appear to be largely irrelevant for young novice drivers. To illustrate, young novice drivers are unlikely to agree with the item asking how often "you forget where you left your car in the car park". Rather, as discussed earlier, the young novice driver, and the male young novice driver in particular, frequently perceives

the car as an extension of their personality. Second, the literature review highlighted a range of key risky behaviours performed by the young novice driver that contributes to their increased crash and injury risk. The majority of these behaviours are missing from the DBQ (for example, carrying peer passengers, driving at night); therefore it can be argued that the instrument is not suitable for measuring the behaviours that contribute to the increased crash risks of the young novice driver.

Third, the items do not exclusively measure *behaviour*; in a number of items, motivations, intent, and cognitive appraisals are combined with behaviour, or one behaviour is contingent upon a prior behaviour. To illustrate, the item "You become angered by a certain type of driver and indicate your hostility by whatever means you can" does not measure behaviour alone. Rather it measures an aggressive response (anger) to a perceived stereotype (certain type of driver), which is required to be followed by – what is presumed to be – an aggressive behaviour (indicating hostility). There is no evidence to suggest young novice drivers assess drivers as a 'certain type', that they will become angry when they have categorised them, and they will then indicate their hostility to this driver in any way they can. Furthermore, the literature review did not highlight 'becoming angry by a certain type of driver and indicating your hostility to them' as a crash contributor for the young novice.

As such, the DBQ does not appear to be a suitable instrument for measuring the *behaviour* of the young novice driver, and research findings from applications of the DBQ in young novice driver populations should be interpreted with caution. Rather, there is a need to develop and refine a comprehensive, reliable and valid instrument to measure the risky driving behaviour of young novices. The DBQ does provide insight into risky behaviours contributing to crashes for older drivers, however, and the reliable DBQ subscales noted above can also be operationalised independently, suggesting that a similarly-structured instrument may prove useful in measuring the risky behaviour of young novice drivers. Thus the research program will explicitly address the need for a young novice driver-specific instrument.

3.4 Operationalising the person

As per Figure 3.1, the person is influenced by, and in turn influences, both their behaviour and the environment (Bandura, 1977). In the context of the young novice driver in this program of research, their driving behaviour in Queensland's enhanced-GDL is influenced by their individual characteristics such as their

psychological distress. Behaviour is not only impacted upon by these individual characteristics but can also influence the characteristics themselves. To illustrate, longitudinal research reveals that risky behaviours can modify attitudes held by adolescents regarding those behaviours (Gerrard et al., 1996). Further, Quinn, Stappenbeck, and Fromme (2011) report that excessive alcohol consumption increased the sensation seeking propensity of tertiary students, consistent with Bandura's RDM. Indeed, interviews with young male drivers have revealed an 'addiction' to speeding, with each maximum journey speed 'beaten' during the next speeding occasion (Falk & Montgomery, 2007). Notwithstanding this effect, the interactive influence of behaviour on the person – and other personal characteristics of interest to the research program such as attitudes, sensation seeking propensity and psychological distress – is beyond the scope of the program of research.

Personal characteristics also influence the environment; for example, the young male novice may select male friends with a similar sensation seeking propensity and therefore drive in a more risky way (Johnson & Malow-Iroff, 2008). Sensation seeking is also impacted upon by the environment; for example an open stretch of road late at night without visible Police presence may encourage the young novice to speed (Falk & Montgomery, 2007). This influence and impact is also beyond the scope of the research. In addition, some risky driving behaviour may be driving error and therefore *unintentional* in nature (e.g., driving at the designated speed in inclement weather) and more relevant to the learning-to-drive process, rather than due to sensation seeking and *intentional* risky driving behaviour (Simons-Morton, 2007b). Again this is beyond the scope of the research program.

Rather, given that the young person has only recently begun driving, psychological traits and states are assumed to have emerged or been characteristic of the young novice driver prior to this time. In addition, the impact of the environment on the person will not be considered; for the purposes of the research program it is assumed that the structural environment (GDL) does not impact upon the personal characteristics of the young novice driver. Further, the impact of the social environment (parents, peers, and the Police) upon the psychological traits and states of the young novice driver is also beyond the scope of the program of research, given that the overarching aims relate to enhancing road safety rather than exploring the influences upon the psychological characteristics of young people in general.

The following sections will review the key psychological characteristics of

young people that the available evidence suggests can impact on both risk-taking in general, and risk-taking on the road. It is noteworthy that personal attitudes were identified as important in the risky behaviour of the young novice driver (section 2.2.1.3.8); however rather than being addressed below they will be captured within Akers' social learning theory (3.5.1).

3.4.1 Kessler's psychological distress (K10) Scale

As noted in 2.2.1.2.2, psychological distress characterised by anxiety and/ or depression can have a negative influence in the life of the adolescent, and the research evidence regarding the role of these factors within the risky behaviour – and crash involvement – of the young novice driver requires further investigation. Given the pervasive influence of psychological distress which may be transient in the adolescent period, it is more appropriate to examine contemporaneous distress and risky driving. Kessler's Psychological Distress Scale, a brief, valid, and reliable tool, represents an ideal way to do this.

Kessler's Psychological Distress Scale (K10) (Kessler & Mroczek, 1994, cited in Andrews & Slade, 2001) is a 10-item measure of psychological adjustment and distress. Factor analytic studies of the K10 have identified the two factors of depression and anxiety (Brooks, Beard, & Steel, 2006). It is frequently utilised in adolescent populations (e.g., Darby et al., 2007). Participants indicate how often in the past four weeks they have felt a particular way (e.g., "nervous") on a 5 point Likert scale of (1) '*none of the time*' to (5) '*all of the time*', low scores indicating low psychological distress and higher psychological adjustment. In addition, whilst the scores are suggested to correspond to psychological distress thus: 10 = no psychological distress; 11-15 = low distress; 16-21 = moderate distress; 22-29 = high distress; 30-50 = very high psychological distress; research has utilised various combinations of thresholds; for example 22-30 = moderate psychological distress, > 30 = severe psychological distress, adjusted in response to the normative experience of psychological distress by adolescents (Huang et al., 2009).

The K10 has been shown to be more clinically accurate in screening for psychological distress than other popular instruments such as the General Health Questionnaire (GHQ) (Furukawa, Kessler, Slade & Andrews, 2003) and the Composite International Diagnostic Interview Short-Form (CIDI-SF) scale (Kessler et al., 2003). For instance, in a comparison of the scope of the items in the K10 to

Criterion A of the DSM-IV (TR) diagnoses of major depressive episode, 8 of the 9 criterion were aligned with 8 of the 10 K10 items, supporting the validity of the instrument (Cairney, Veldhuizen, Wade, Kurdyak, & Streiner, 2007). Whilst not a diagnostic tool, higher K10 scores correspond to a greater probability the respondent meets the criteria for a current DSM-IV (TR) or CIDI mental disorder diagnosis (e.g., a K10 score of 40-50 corresponds to a 77.8% probability of an affective disorder and a 68.1% probability of an anxiety disorder, Andrews & Slade, 2001).

As noted, the K10 has previously been applied in Australian adolescent populations, and it has been found to be associated with substance abuse (e.g., Lubman, Allen, Rogers, Cementon, & Bonomo, 2007); suicidal ideation (e.g., Taylor, Dal Grande, Gill, Fisher, & Goldney, 2007); and obesity in young women (e.g., Darby et al., 2007). Whilst the K10 has not featured prominently in the road safety domain, it would be beneficial to use the K10 for understanding the nature and extent of the psychosocial influences of depression and anxiety upon the risky behaviour of young novice drivers, in both cross-sectional and longitudinal research. As such, the proposed research may reveal avenues of intervention, for example adolescent mental health interventions may be of benefit if the young novice is found to be experiencing psychological distress and this is associated with risky driving.

3.4.2 The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ)

As noted in 2.2.1.2.3, it seems reasonable to suspect that the reward and punishment sensitivity of the young novice driver may be likely to impact upon the commencement and continuation of risky driving behaviours which place the young novice driver at increased risk of death and injury in a car crash. Further, countermeasures such as legislation and enforcement rely upon the threat and imposition of punishments. However young novice drivers may not be particularly sensitive to punishments and therefore countermeasures may need to consider alternative mechanisms of behaviour of modification. Similarly, the risky driving behaviours of young novices may be motivated and/or regulated by their sensitivity to rewards, which may be age-appropriate by virtue of the associated maturational implications of being an adolescent. Again, countermeasures may need to explicitly consider the connections between rewards and risky behaviours, irrespective of whether they are intentional or unintentional.

The individual's responses to rewards appear to be regulated by their behavioural activation system (BAS), whilst the individual's responses to punishments appear to be regulated by their behavioural inhibition system (BIS) of motivation. These neurological systems therefore influence the individual's sensitivity to reinforcing events and also control their experiences of emotion (Torrubia, Avila, Molto, & Caseras, 2001). As such, these systems have been aligned with the individual's psychological traits and states: the BAS has been aligned with impulsivity, and the BIS has been aligned with anxiety (Sava & Spernae, 2006).

The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) created by Torrubia, Avila, Molto and Grande (1995, cited in O'Connor, Colder, & Hawk, 2004), was designed to explore self-reported sensitivity to punishments (BIS) and rewards (BAS) via 48 forced choice (*yes, no*) items. The SPSRQ has been utilised in university populations around the world, and has been found to predict risky attitudes and behaviours in drivers (e.g., in Spain, Torrubia et al., 2001; and in Taiwan, Li, Huang, Lin, & Sun, 2007). Individuals with low reward sensitivity and high punishment sensitivity are least likely to infringe road rules, and reward sensitivity is the greatest predictor of risky driving. There has also been mixed evidence regarding the extent to which young adults are sensitive to these measures, such that sensitivity to reward has been found to influence the risky driving behaviour of young adults, whilst sensitivity to punishment did not influence the non-risky driving behaviour of young adults (Castella & Perez, 2004). Young males also have been found to respond more to rewards than to punishments in comparison to young females (Li et al., 2007). Therefore the research program will use the Sensitivity to Punishment and Sensitivity to Reward Questionnaire to measure punishment and reward sensitivity respectively.

The BAS and BIS motivation systems have previously been explored in the delinquent behaviour of a sample of 259 adolescents attending two high schools in Queensland (Fergusson, Vitaro, Wanner, & Bredgen, 2007), however the SPSRQ has not been previously utilised for young novice driver research in Australia. The research program will provide insight into Queensland's young novice drivers' sensitivity to rewards and punishments, and the role of each in influencing the risky behaviour of the young novice driver. In addition, upon reflection it seems that the influence of punishment sensitivity upon the engagement of risky behaviour – such as on the road – is akin to the influence of psychological distress. More specifically,

individuals who are anxious and/or depressed are frequently oriented to perceive negative cues in their environment and this can alter their behaviour (e.g., Darby et al., 2007), which appears consistent with the regulatory capacity of punishment sensitivity. Therefore the relationship between the psychological characteristics of punishment sensitivity, depression and anxiety will be examined within the research program, in cross-sectional and longitudinal research.

3.4.3 The Impulsive Sensation Seeking Scale (ISSS) and the Brief Sensation Seeking Scale (BSSS)

As noted in 2.2.1.2.4, sensation seeking has been found to influence the risky driving behaviour of young novice drivers, and particularly the behaviour of *male* young novice drivers. Accordingly, a comprehensive program investigating the risky driving behaviour of young novice, guided by Bandura's RDM, should consider the nature and influence of this psychological trait.

Recently a number of researchers have focused on the driving-specific dimensions of sensation seeking as measured by the Thrill Seeking Scale (TSS) (Lawton, Parker, Manstead, & Stradling, 1997), which has been found to predict risky driving behaviour in young adults (e.g., Bates et al., 2009a; Scott-Parker, Watson, & King, 2009a). The TSS does not, however, appear suited to exploring sensation seeking propensity in the young *Learner* driver. To illustrate, the mandated constant supervision by a qualified driver is likely to preclude the young Learner driver from reporting they "enjoy cornering at high speed", as measured in item 8. Accordingly, it was decided to utilise other scales measuring sensation seeking propensity in the program of research.

The impulsivity-sensation seeking items of the 19-item Zuckerman-Kuhlman Impulsivity-Sensation Seeking scale (ISSS) (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993) specifically explores the desire, tendency, and willingness for young persons to engage in risky behaviour as they impulsively seek thrilling and exciting sensations. Whilst not specifically related to the driving task, the ISSS is suitable for the novice with a Learner and a Provisional driver's licence. It has been used in adolescent populations (e.g., in Spain, Goma-i-Freixanet, Valero, Punit, & Zuckerman, 2004); and has been found to be predictive of risky behaviour (e.g., illicit drug use, alcohol consumption, Zuckerman & Kuhlman, 2000), including risky driving (Jonah, Thiessen, & Au-Yeung, 2001; Zuckerman & Kuhlman, 2000) and

the driving violations subscale of the DBQ (Rimmo & Aberg, 1999).

The reliable and valid Brief Sensation Seeking Scale (BSSS) (Palmgreen, Donohew, Loch, Hoyle, & Stephenson, 2001) incorporates a subset of eight items from the ISSS. For both the ISSS and BSSS, participants respond to items such as item 6 "I prefer friends who are excitingly unpredictable" on a 5-point Likert scale of '*strongly disagree'* to '*strongly agree'*. The BSSS has been utilised in adolescent populations and has similarly been found to be predictive of their risky illicit drug use behaviour (e.g., Palmgreen et al., 2001; Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002; Stephenson, Hoyle, Palmgreen, & Slater, 2003).

The research program will provide insight into the sensation seeking propensity, and its influence upon the risky behaviour, of the young novice driver. In addition, young novice driver research within Australia has not utilised the BSSS, therefore this will be the first application of this tool in this driving population. Further, it appears that sensation seeking propensity is consistent with reward sensitivity, and research suggests that the two variables are highly correlated (e.g., r = .45, Torrubia et al., 2001). What is unclear however, is whether the influence of these characteristics upon the self-reported risky driving behaviour of young novices are actually subsumed within the other, or whether these variables exert separate, significant influence. Therefore the relationship between the psychological characteristics of reward sensitivity and sensation seeking propensity will also be examined within the research program, in both cross-sectional and longitudinal research. Most importantly, the examination of the relationships between and amongst reward and punishment sensitivity, anxiety and depression, and sensation seeking propensity will be examined. As such, the research may also reveal patterns between and amongst these psychological traits and states and self-reported risky driving behaviour, highlighting further avenues of young novice driver safety intervention.

3.5 Operationalising the environment

As per Figure 3.1, the environment is influenced by, and in turn influences, both the behaviour and the person. In the context of the young novice driver in the research program, the environment component of Bandura's model will be conceptualised in terms of two key sources of influence for the young person: the social environment (parents, peers, Police) and the structural environment (enhanced-GDL). The structural driving environment is essentially identical for all

young novice drivers in Queensland, given the enhanced-GDL system operates state-wide (see 2.3.1.1). In contrast, the social environment differs for every individual; however the general constructs of influence within the social environment are predominantly similar. As explained in the sections below, the dynamic social environment will be described in terms of social learning principles inherent in Akers' social learning theory including imitation of important models who also reward and punish behaviours, and prototypes and willingness to be risky, prior behaviours and driving intentions, which are elements of Gerrard and Gibbons' prototype/willingness model.

3.5.1 Akers' social learning theory (SLT)

A range of psychosocial theories have been utilised in road safety research in recent times (e.g., theory of planned behaviour, protection motivation theory). Whilst consideration was given to these theories, it was decided to use Akers' social learning theory (SLT). This is because, as noted in section 2.2.3, in addition to personal factors such as attitudes, broader social influences including modeling and reinforcement are involved in the risky behaviour of young novice drivers. This appears particularly pertinent to the initiation and maintenance of on-road driving behaviours, and intentional risky driving maneuvers specifically. Moreover, parents and peers – the social environment of the young novice driver – are pivotal in the context of the young novice engaging in both intentional and unintentional risky driving: parents act as models of driving behaviours for many years before the adolescent is licensed, and then they provide supervision and driving instruction for the novice; the intermediate driver frequently carries their friends as their passengers. As such both groups are potentially central to the risky behaviour of the young novice driver, and the nature and extent of their influence can be captured and thus examined within a social learning theory framework.

Fundamentally, Akers' SLT considers the pervasive influence of social learning through observation and imitation in the development and maintenance of risky attitudes, expectancies, and behaviours. To illustrate, attitudes, differential reinforcement (an overall balance of rewards and punishment), and differential association with risky peers has been found to predict such behaviours as delinquency and gang membership (Heaven, Caputi, Trivellion-Scott, & Swinton, 2000; Heimer & de Coster, 1999; Hochstetler, Copes, & De Lisi, 2002; Winfree,

Backstrom, & Mays, 1994) and substance use (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Winfree & Bernat, 1998), including alcohol (Ennett et al., 2008; Hwang & Akers, 2003; Ostergaard, 2009), tobacco (Chen et al., 2006; Kobus, 1998; Krohn, Skinner, Massey, & Akers, 1985), and illicit drugs (Farrell & White, 1998) such as marijuana (Brauer, 2009).

Akers' SLT specifically considers the social learning of the adolescent in deviant behaviour, and as the majority of risky driving by the young novice involves non-compliance with general and GDL-specific requirements and restrictions – which can be interpreted as deviant behaviour – Akers' theory will be operationalised in the program of research. Consistent with the social environment dimension of Bandura's RDM, peers and parents are pivotal in the social learning of driving behaviour (Michael & Ben-Zur, 2007; Kellerman, 2008). For example, the engagement of Israeli adolescents in risky behaviours, including driving, was related to their differential association with their peers (for males in particular) and with their parents (specifically for the female adolescents) (Michael & Ben-Zur, 2007).

Akers' SLT emerged in the 1960s, extending traditional social learning theory principles of a decade earlier (Bandura, Ross, & Ross, 2003) to the criminological domain (Akers, 2009). The theory was developed to account for the persistent finding that youth are more likely to indulge in deviant behaviour if they differentially associate with peers who are accepting of and/ or promote such deviance (Akers et al., 1979; Hochstetler et al., 2002). *Normative definitions* (herein referred to as 'attitudes' in accordance with contemporary psychological terminology) are influenced by significant others such as parents and peers, and represent the individual's general and more specific beliefs about socially- and culturally-appropriate rules and values. The duration, intensity, frequency, and priority of *differential association* with parents and peers with whom adolescents interact varies, with greater association leading to greater influence.

Whilst the initial behaviour is primarily learned by the young driver through *imitation*, continuing behaviours are influenced by *differential reinforcement*, which is the balance of actual and perceived reinforcement. Anticipated *rewards* – which include social and non-social sources of rewards – are likely to increase the frequency of the behaviour. Conversely, anticipated *punishments* – similarly from social and non-social sources – are likely to reduce the frequency of the behaviour (Akers & Sellers, 2004; Brezina & Piquero, 2003). Therefore integrating the social

learning framework with the problem of the young driver performing risky behaviour, the young driver differentially associates with their parents and their peers, who provide both models of behaviour and are sources of attitudes and behaviour to imitate, and the parents and peers then reward and punish the risky attitudes held and the risky behaviours performed by the young driver. Figure 3.2 illustrates Akers' SLT model.

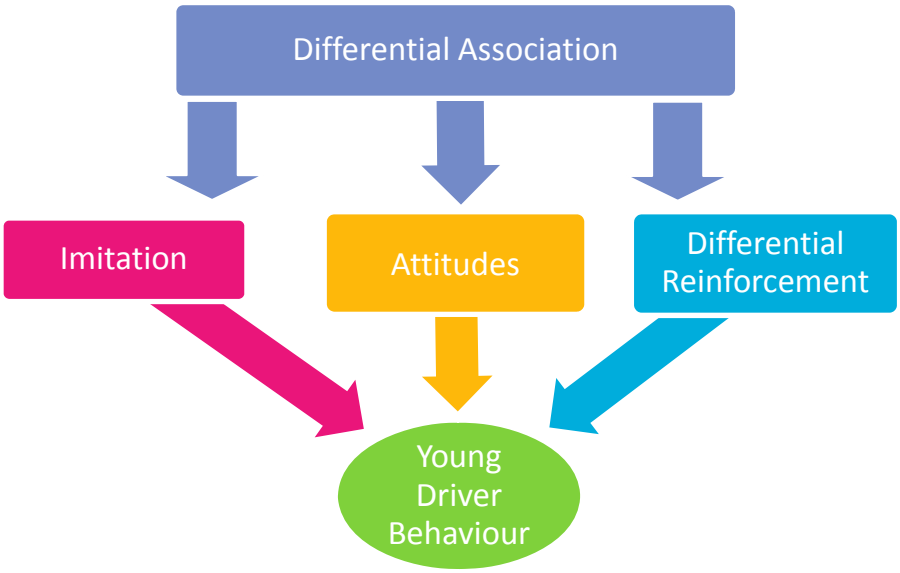


Figure 3.2 Akers' social learning theory

After "A social learning theory of crime", by R. L. Akers, 2009, in F. R. Scarpatti, A. L. Nielsen, and J. M. Miller (Eds.), *Crime and criminals: Contemporary and classic reading in criminology (2nd ed.)* (pp. 214-225). New York: Oxford University Press.

Self-report questionnaires are typically used to operationalise Akers' theory (e.g., see Akers et al., 1979) in which the participant ranks the frequency of the behaviour under investigation (e.g., 'how often do you use alcohol' scaled from '*never'* to '*nearly every day'*) and the strength and direction of attitudes they hold (e.g., 'following all the road rules doesn't let me test the levels of my car' scaled from '*strongly disagree'* to '*strongly agree'*). Imitation is gauged by exploring the relevant models for the participant, and by measuring the perceived favourable and unfavourable attitudes of models imitated by the young novice driver. The attitude of differential association is measured by the participant scaling the perceived favourable, unfavourable and neutral attitudes held by these significant models. The behavioural dimension of differential association is measured by the participant

reporting, for example, the number of their friends they have who engage in the risky behaviour each week, such as drinking excessive amounts of alcohol (Preston & Goodefellow, 2006), and how much time they spend with those friends. Differential reinforcement is quantified by exploring the actual and anticipated social and non-social rewards received from performing the risky behaviour, as well as the actual and anticipated social (including legal) and non-social punishments.

The operationalisation of Akers' SLT within the contexts of drinking, smoking, illicit drugs, and criminal behaviour, typically in adolescent populations (Shinew & Parry, 2005), has explained substantial variance in deviant behaviour, frequently over and above other theoretical applications. Forty-one percent of variance in adolescent smoking (Krohn et al., 1985) and 68% of marijuana and 55% of alcohol use (Akers et al., 1979) has been accounted for by Akers' theory variables. Akers' theory also explained 67% of variance in Korean adolescent's substance use, far exceeding the 15% and 12% explained by social bonding and self-control theory respectively (Hwang & Akers, 2003). Differential association with peers has predominantly emerged as the strongest predictor of risky health behaviours such smoking in adolescent Italian populations (Bonino et al., 2005), and 'change in friends' was the only significant predictor of smoking cessation in more than 300 adolescent New Jersey residents (Chen, White, & Pandina, 2001).

Parents and peers have been found to be influential upon the seat belt use of Spanish young drivers (Gras, Cunill, Sullman, Planes, & Font-Mayolas, 2007), and there has been limited but promising application of the social learning constructs within the realm of road safety. DiBlasio (1987) reported that differential association with peers, differential reinforcements, modeling, and attitudes favouring risky behaviour significantly predicted whether a sample of American youths aged less than 15 years travelled as passengers of drinking drivers. Differential association was found to be the principal psychosocial influence upon the intentions of 309 suspended and disqualified adult Australians to drive whilst unlicensed, with prediction based on Akers' social learning variables being superior to prediction based on deterrence theory for the most non-compliant participants (Watson, 2004a). Fleiter et al. (2006) also found that Akers' social learning variables significantly explained self-reported speeding behaviour over and above the explanatory contribution of deterrence theory in 320 Australian adults aged 17 to 79 years. A study of the drug driving behaviour of Queensland university students aged 17 to 56

years reported that drug driving was positively correlated with social rewards and negatively correlated with social punishments (Armstrong et al., 2005).

More particularly, whilst the 16-24 year old young driver's socio-demographic variables of age, gender and driving exposure explained 19% of the variance in their risky behaviour, Akers' social learning variables explained a further 42% of the variance of this risky behaviour (Scott-Parker et al., 2009a). Furthermore, when the influences of parents and peers upon the risky behaviour of the young drivers were separated for the variables of anticipated rewards, anticipated punishments, and norms, the linear combination of peer and parent factors accounted for 59% of the variance in the risky driving behaviour. Parents and peers were also found to differ in their influence on the risky behaviour of young drivers: overall the significant predictors of young driver risky behaviour were found to be peer norms and peer and parent rewards, but exploratory analyses revealed that these influences differed by the gender of the young driver. To illustrate, for young female drivers, parent rewards and peer punishment were significant predictors of risky behaviour; whilst for young male drivers, peer and parent punishment and parent norms were approaching significance (Scott-Parker et al., 2009b).

Akers' SLT does not consider the role of prior risky behaviour in current risky behaviour. The apparent relationship between past and present behaviour found in research operationalising psychosocial theories such as the theory of planned behaviour and the prototype/willingness model however, suggest that a comprehensive investigation of the risky driving behaviour of young novice drivers should specifically examine the role of prior behaviour. Further, willingness to be risky, prototypes, and driving intentions have also been found to be influential in the risky driving of young novices. The influence of prior behaviour, willingness, intentions and prototypes are explicitly considered within the prototype/willingness model (PWM), therefore these elements of Gerrard and Gibbons' PWM will be operationalised to augment Akers' theory, thereby allowing a more comprehensive exploration of the risky behaviour of young novice drivers, and the environmental and personal influences upon this behaviour.

3.5.2 Gerrard and Gibbons' prototype/willingness model (PWM)

As noted in 2.2.3, other social influences upon the risky driving behaviour of young novices include prototypes and a willingness to be risky which frequently

occurs in the company of friends, that is, within the context of a social environment. Elements of Gerrard and Gibbons' prototype/willingness model (PWM) of health behaviour can be used to extend Akers' SLT. The PWM asserts that the majority of adolescent health risk is as a consequence of risky prototype appraisal, a willingness to be risky, prior risky behaviour, and intentions to engage in risky behaviour in the future (Ouellette et al., 1999). In addition to these constructs, personal attitudes and normative beliefs of parents and peers are also considered in the PWM, however in the research program these constructs have already been captured within Akers' SLT (3.5.1). The temporal relationship between PWM variables and risky behaviour is essential, with constructs measured at Time 1 predicting risky driving measured at Time 2. Figure 3.3 illustrates the PWM. As can be seen, Time 1 measures of previous risky driving behaviour, attitudes, subjective norms, prototypes, behavioural intention, and willingness influence Time 2 risky driving behaviour.

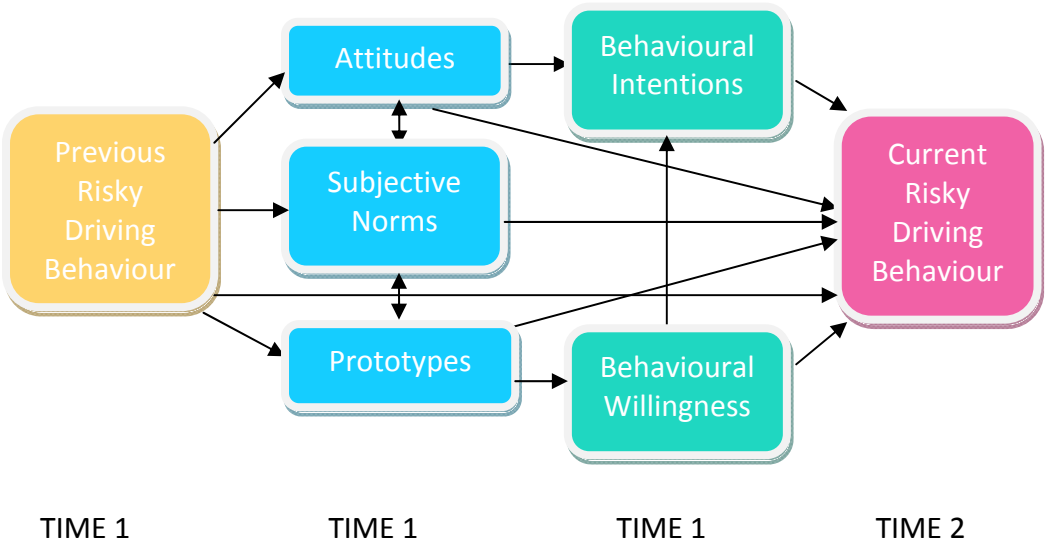


Figure 3.3 Gerrard and Gibbons' prototype/willingness model

Adapted from "A dual-process approach to health risk decision making: The prototype willingness model", *Developmental Review, 28*, 29-61.

To operationalise Gerrard and Gibbons PWM in the context of this program of research, young drivers need to describe their prototype of the 'typical young driver who bends road rules' by ranking 6 favourable and 6 unfavourable adjectives such as 'cool' and 'foolish' on a 5-point Likert scale of '*not at all*' to '*extremely*'. Behavioural willingness is gauged by describing a scenario which includes the risky behaviour of interest and a range of potential responses, and the participant reports

the likelihood they would perform each of these on another 5-point Likert scale ('*not very likely*' to '*very likely*'). Risky behaviours of interest are measured at two or more time points, with the risky behaviour at Time 1 operationalised as a predictor of the risky behaviour at Time 2 or later. Intention to engage in risky driving behaviour is assessed by asking the participant the likelihood they will perform the risky behaviour over the next year on a 5 or 7 point Likert scale.

Adolescent risky behaviour such as underage drinking, inadequate birth control, smoking, and risky driving in American university students (e.g., Gibbons & Gerrard, 1995) and junior high school students (e.g., Gerrard et al., 1996) has been explored using the PWM. Longitudinal analyses (e.g., over three years, Gibbons, Gerrard, Blanton, & Russell, 1998) have found that risky behaviour was predicted by favourable prototypes, and these in turn developed in response to the young person associating with friends who both performed and encouraged that behaviour (Blanton et al., 1997). Path analysis has also revealed that risky behaviour such as smoking and drinking is preceded by both behavioural willingness and behavioural intention (Gibbons et al., 1998).

The PWM has been operationalised in Australian research (e.g., organ donation, Hyde & White, 2010), however, young driver research in Australia has not utilised the PWM to date. Whilst the PWM has been used to augment the Theory of Planned Behaviour (e.g., Rivis, Sheeran, Armitage, 2006; Zimmerman & Sieverding, 2010), the PWM has not been used to augment Akers' SLT in a more full exploration of the psychosocial influences upon young driver risky behaviour. Given research findings into adolescent health risk behaviour and the premise underlying the PWM constructs of prototype, willingness, behaviour, and intentions operationalised within the theory, these elements of the PWM will be used to augment Akers' SLT in the proposed research.

3.6 Research questions four and five

3.6.1 Research question four

The literature review regarding the methodologies and instruments used to measure the risky driving behaviour of young novices reveals the need for a reliable and valid instrument specifically suited to the young novice driver. Development and applications of the DBQ, and the literature review of the contributing factors to young novice driver crashes, suggests that there may be clusters of these risky

driving behaviours such as driving violations and risky exposure. Therefore research question four is "*What are the underlying dimensions to the risky behaviour of young novice drivers in an enhanced GDL, and can they be measured in a valid and reliable way?*"

3.6.2 Research question five

The literature review of 3.5 has highlighted the relevance of Akers' SLT for examining the environmental (social) influences upon the risky driving behaviour of young novices. Importantly, elements of the PWM appear to address psychosocial influences which are not considered within Akers' SLT. In addition, the individual's psychological traits and states including psychological distress, reward and punishment sensitivity, and sensation seeking propensity, influence the risky driving behaviour of young novices. Such pervasive characteristics of the individual are also excluded from the constructs comprising Akers' SLT. Furthermore, Bandura (1983) asserts that whilst examining the person, the environment, or the behaviour in isolation may clarify some of the relationships, considering all three domains simultaneously is likely to explain greater variance in events. Therefore research question five is "*Can Akers' SLT explain the risky behaviour of young novice drivers in an enhanced GDL, and can this explanatory ability be enhanced by augmenting it with elements from other social psychological theory and individual characteristics relevant to young novice driver risky behaviour?*"

3.7 Chapter summary

Chapter Three summarised the theoretical and methodological framework guiding the program of research. Such a framework is fundamental in comprehensively examining the risky driving behaviour of young novices, and to inform the development and evaluation of effective countermeasures (Shope, 2006). In addition, instruments that have been used to measure psychological states and traits that may be influential in the risky driving behaviour of young novices were summarised. Akers' SLT was reviewed, and the potential ability of elements of the PWM to augment Akers' theory was discussed. The next chapter, Chapter Four, will provide an overview of the papers comprising the program of research. Specifically, the 11 papers reporting the main research findings will be positioned within Bandura's RDM.

Chapter Four: Overview of the Research Program and Related Publications

4.1 Introductory comments

This chapter provides an overview of the research program and the related publications. The evidence presented in Chapters One and Two highlighted the need for a more extensive and comprehensive understanding of the intentional and unintentional risky driving behaviour of young novices. Chapter Three drew attention to the suitability of psychological theories and measures to be applied within this research, positioning them within the framework of Bandura's RDM and the dimensions of *behaviour*, the *person*, and the *environment*. Specifically, in relation to the program of research, (1) the *behaviour* of the young novice driver includes various aspects of their self-reported driving behaviour, such as driving in excess of posted speed limits; (2) the *person* pertains to the individual's personal characteristics and psychological states and traits, including depression, anxiety, reward and punishment sensitivity, and sensation seeking propensity; and (3) the *environment* consists of the structural environment of Queensland's enhanced-GDL program within which the young novice driver is expected to learn to drive; and the social environment consisting of the social influences upon the young novice driver, which is primarily comprised of the parents and the friends of the young novice driver, but also includes the influence of other young drivers and the Police.

4.2 Aims of the research program

The aims of the research program which are stated in section 1.3 (page 7) are related to the overarching need to improve young driver safety. Specifically there is a need to more fully understand the driving behaviours of young novices, and the nature and extent of the personal and social influences upon their risky driving. The context and structural environment of the research is an enhanced-GDL program. The research questions which are stated in sections 2.4 (pages 53-54) and 3.6 (pages 77-78) emerged from the literature review and the appraisal of theoretical frameworks in Chapters Two and Three respectively, and provide the focus to achieve the research aims. The remainder of this Chapter provides an outline of the research program which consisted of quantitative and qualitative methods within three stages of research. A summary of each of the 11 papers which comprise the thesis-by-publication will be presented including the association of each paper with the research aims and the research questions.

4.3 Overview of the thesis structure and contribution of the papers to the aims of the research program

Chapter One outlined the scope and nature of the increased risks of injury and fatality arising from road crashes experienced by the young novice driver. Chapter Two summarised the range of variables which have been found to be associated with and to contribute to this increased crash involvement and the variety of countermeasures targeting the increased risks experienced by the young novice. Chapter Three presented the key theoretical approaches used in the research program to explore the risky driving behaviour of young novices in Queensland. The need for an instrument designed specifically to measure the risky behaviour of young novice drivers was also highlighted.

Table 4.1 summarises the three distinct research stages (Stage One: Foundation research comprising stages 1A and 1B, Stage Two: Learner Driver research, and Stage Three: Provisional Driver research), the research methodology utilised in each of the 11 papers comprising this thesis (quantitative and/ or qualitative, cross-sectional and/ or longitudinal), and the alignment of each paper with the five aims of the research program and the five research questions designed to inform these aims. As can be seen, both quantitative and qualitative research methodologies were employed to comprehensively examine the risky behaviour of the young novice driver within the context of Bandura's RDM dimensions of behaviour, person and the environment. Furthermore, every paper informs the development of countermeasure(s) targeting not only young novice drivers but also their parents (as specified in research aim 5).

4.3.1 Stage One: Foundation Research

Stage One provided the foundation for the research program and comprised two phases. In the quantitative component of Stage One (Study 1A), young novice drivers completed an online survey (Appendix B) exploring their sociodemographic characteristics, their risky driving behaviour, their punishment and reward sensitivity anxiety and depression, and future driving intentions. In the qualitative component of this Stage (Study 1B), small group and individual interviews were used to explore the driving behaviours of the young novice driver, their perceptions regarding the distinction between bending and breaking road rules, and their experiences of imitation and differential reinforcement within the framework of Akers' SLT

Table 4.1 Research stages, research methodology, and alignment with the research aims and questions for each paper comprising the thesis by publication

		Paper										
		1	2	3	4	5	6	7	8	9	10	11
Research Stage	1A	■	■	■								
	1B				■						■	
	2					■	■	■	■	■	■	
	3						■	■	■	■	■	■
Research Method-ology	Quant	■	■	■		■	■	■	■	■	■	■
	Qualit				■						■	
	Cross	■	■	■	■	■	■	■	■	■	■	■
	Long						■	■	■	■	■	
Research Aims	1		■	■	■			■	■	■	■	
	2	■			■		■	■			■	■
	3				■	■	■				■	
	4		■	■	■					■	■	
	5	■	■	■	■	■	■	■	■	■	■	■
Research Questions	1	■					■	■	■		■	■
	2					■	■	■				
	3		■	■	■		■	■	■	■	■	
	4	■					■					■
	5		■	■	■				■	■	■	

Note: Quant = quantitative, Qualit = qualitative, Cross = cross-sectional, Long = longitudinal.

(Appendix C). In addition, a list of prototype adjectives was generated, allowing the definition of unsafe and safe prototypes within Gibbons and Gerrard's PWM. Stage One was fundamental for developing the research instruments used in the remaining two stages. Figure 4.1 illustrates the papers and dimensions of influence explored with the research program during Stage One, framed within Bandura's RDM.

4.3.2 Stage Two: Learner Driver Research

In Stage Two, a quantitative survey (Appendix D) was used to explore the sociodemographic and psychosocial characteristics, attitudes, and driving behaviours of young novices from across Queensland when they held a Learner driver's licence. Furthermore, the experiences of these Learners with Queensland's enhanced GDL

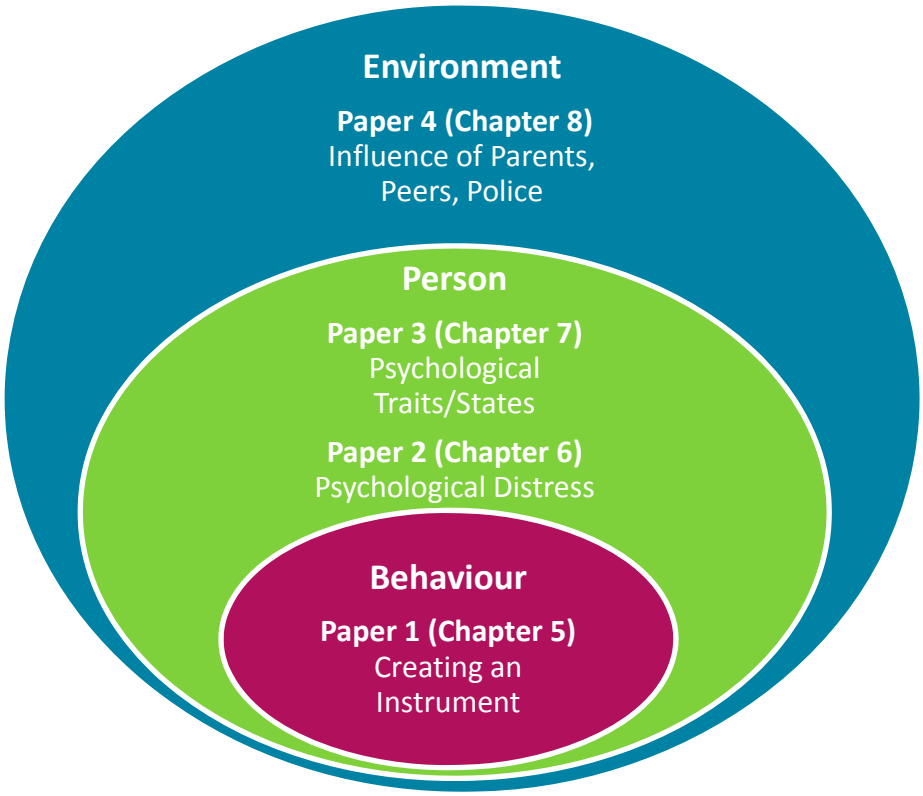


Figure 4.1 Organisation of the thesis by papers within Bandura's reciprocal determinism model for the Foundation research (Stage One)

program were explored, including driving undertaken before they had a valid driver's licence (pre-Licence driving). Whilst the Learner Driver Research was cross-sectional in nature, the novices were recruited as part of longitudinal research which included the Provisional Driver Research undertaken in Stage Three.

4.3.3 Stage Three: Provisional Driver Research

In Stage Three, the quantitative survey tool used in Stage Two was re-administered to the Stage Two participants. A number of items relating to the young novice's driving experiences both as a Learner and before they were licensed were removed from the survey, and the remaining items were modified to focus upon their *Provisional*, rather than their *Learner*, experiences, attitudes and behaviours (Appendix E). The survey was completed after the novice had held their Provisional 1 driving licence for six months. Whilst the Provisional Research comprised a cross-sectional survey, longitudinal analyses were conducted for the participants who completed the surveys in both Stages. Figure 4.2 illustrates the papers and

dimensions of influence explored within the research program for Stages Two (Learner Driver Research) and Three (Provisional Driver Research) framed within Bandura's RDM.

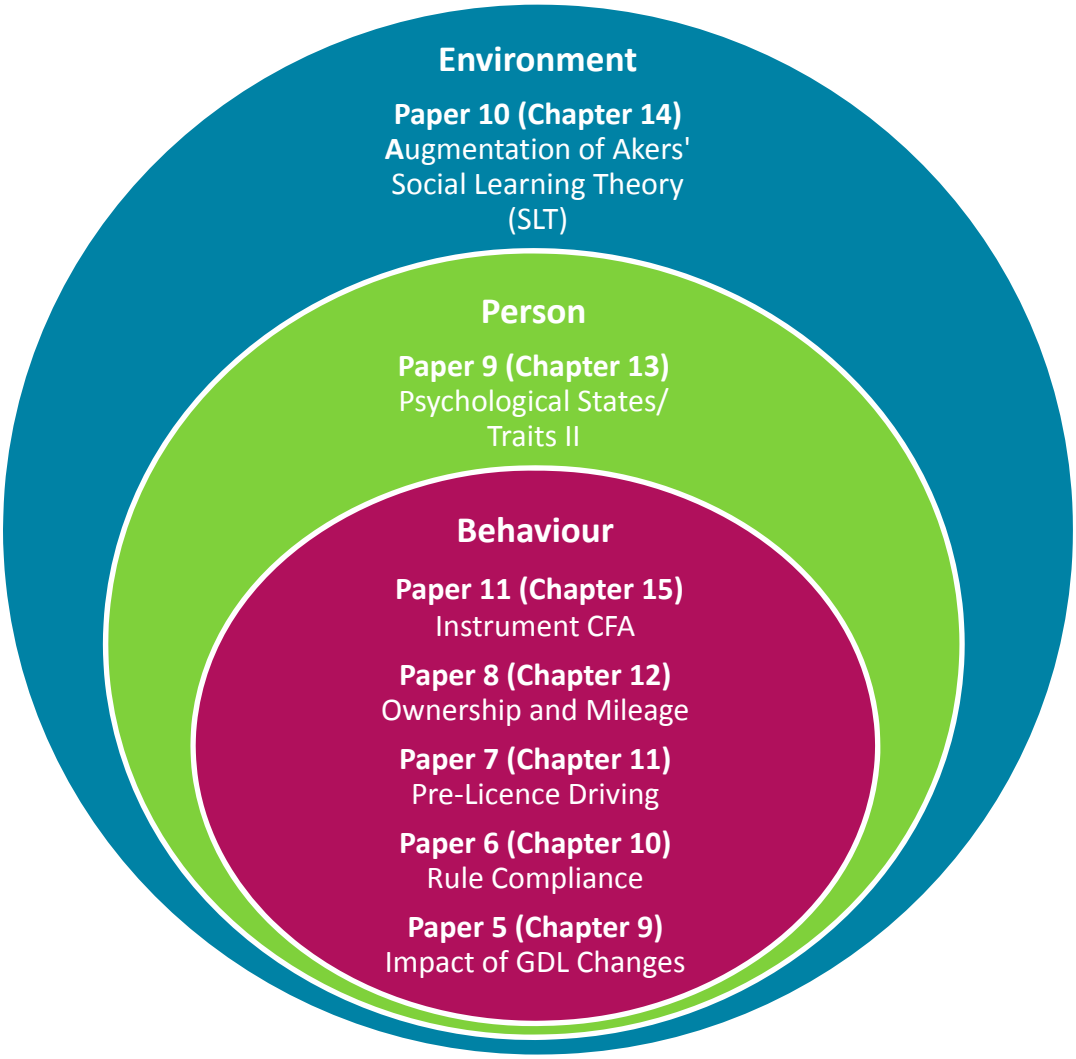


Figure 4.2 Organisation of the thesis by papers within Bandura's reciprocal determinism model for the Learner (Stage Two) and Provisional (Stage Three) driver research

4.4 Organisation of papers

The papers are organised within the three distinct stages of the research, and the three inter-related aspects of influence within Bandura's RDM. As can be seen in Figure 4.1, Papers One, Two, Three, and Four pertain exclusively to Stage One, Paper Five reports the findings of the research of Stage Two only, and Papers Six, Seven, Eight, and Nine present data collected in both Stages Two and Three. In

addition, Paper Ten explored data collected during all three Stages, and Paper Eleven presents data collected in Stage Three only. The paper order as summarised in Figures 4.1 and 4.2 and Table 4.1 reflects Bandura's RDM dimensions of behaviour, person, and environment, and the underlying structure of the program of research.

4.4.1 Paper One

Scott-Parker, B., Watson, B., & King, M. J. (2010). The risky behaviour of young drivers: Developing a measurement tool. In *Proceedings of the 20th Canadian Multidisciplinary Road Safety Conference, Niagara Falls, Ontario, June 6-9.*

Paper One (Chapter Five) was the first paper to investigate the *behaviour* dimension of Bandura's RDM, exploring the nature of the risky driving behaviours of young novices (research question one) who attended a tertiary institution in Queensland. Exploratory factor analysis was performed upon the quantitative cross-sectional data which were collected via an online survey. It was important that this study be undertaken at the outset of the research program, given the need for a valid instrument to consistently measure the self-reported risky driving behaviour of young novices as outlined in Chapter Three. This instrument played a crucial role in the overall research program, as the composite scale – and, on occasion, the subscales – were used as measures of risky driving in the majority of the remaining papers, and the instrument in its entirety was incorporated in both the Learner and Provisional Driver research of Stages Two and Three. The internally-reliable Behaviour of Young Novice Drivers Scale (BYNDS) contained five subscales (research question four) consistent with the variables reported in the literature as contributing to young novice driver road crashes also summarised in Chapter Two. This paper operationalised the second aim of the thesis in that it contributed to improved measurement of young novice driver risky behaviour. This paper also aligned with research aim five, revealing both individual and clusters of risky driving behaviours performed by young novices that can be targeted via countermeasure(s).

4.4.2 Paper Two

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2011). The psychological distress of the young driver: A brief report. *Injury Prevention, 17,* 275-277. doi: 10.1136/ip.2010.031328

Paper Two (Chapter Six) was the first paper in this research program to

explore the *person* dimension of Bandura's RDM, and it is the first paper to use the instrument developed in Paper One. The influence of psychological distress upon the risky behaviour of young novice drivers remains unclear (see 2.2.1.2.2); therefore the Stage One survey also contained items specifically examining the psychosocial characteristics of the young novice driver. More particularly, the influence of the psychological distress (anxiety and depression) experienced by the young novice upon their risky driving behaviour (research questions three and five) was examined via correlations and hierarchical multiple regression analyses. In addition, separate analyses were undertaken for each gender. In this regard, Paper Two contributed to research aims one and four, allowing a greater understanding of the nature and extent of the psychosocial influences upon the risky behaviour of young novice drivers in Queensland, whilst applying a theoretical approach and using a reliable instrument in the research. Research aim five was also addressed as the findings were able to inform the development of targeted countermeasures, such as a mental health intervention for young novice drivers, primarily as young novice drivers are also adolescents who are progressing through a developmental period associated with increased psychological distress.

4.4.3 Paper Three

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). The influence of sensitivity to reward and punishment, propensity for sensation seeking, depression, and anxiety on the risky behaviour of novice drivers: A path model. *British Journal of Psychology, 103*(2), 248-267. doi: 10.1111/j.2044-8295.2011.02069.x

Paper Three (Chapter Seven) was the second paper to examine Bandura's *person* dimension. This paper built upon the research findings of Paper Two by providing a comprehensive and extensive exploration of the relationships between psychological states (psychological distress experienced as depression and anxiety; Paper Two), and psychological traits (sensitivity to reward and punishment, sensation seeking propensity). In addition, their role in the risky driving behaviour of young novices was gauged by operationalising the instrument developed in Paper One (research questions three and five). Mediation analysis via path modeling was undertaken to demarcate the influence of each of these variables in risky driving. Importantly, moderation analyses was undertaken to explore the differential influence of these psychological traits and states for the male and female young

novice driver. In light of the significant contributions of sensation seeking propensity, reward sensitivity, and psychological distress, these measures were included in the instrument used in Stages Two and Three of the research program. Paper Three aligned with research aims one, four and five, allowing unique insight into the nature and extent of psychosocial influences upon young novice driver risky behaviour, and concurrently enhancing the theoretical approach to exploring risky driving behaviour. In addition the findings can inform countermeasure development as existing measures to date, including Queensland's GDL (see 2.3.1.1), have not fully considered the potentially influential role of sensation seeking and reward sensitivity in the risky driving of young novices, and by young males in particular.

4.4.4 Paper Four

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). "They're lunatics on the road": Exploring the normative influences of parents, friends, and police on young novices' risky driving decisions. *Safety Science, 50*(9), 1917-1928. doi: 10.1016/j.ssci.2012.05.014

Paper Four (Chapter Eight) was the final paper from Stage One and was the first paper in the research program to explore the *environment* dimension of Bandura's RDM. The quantitative research methodology utilised thus far in the program of research had provided unique insight into the nature of young novice drivers' risky behaviours and the psychological traits and states that influenced this behaviour. As discussed in Chapters Two and Three, however, the program of research was designed to also investigate the normative influences of parents, friends, and the police upon the risky behaviour of the young novice driver, and this investigation was guided by relevant psychosocial theory. Accordingly, Paper Four operationalised a qualitative research methodology which allowed an in-depth investigation of the young novice driver's behaviours, attitudes, imitation of, and punishments and rewards received or anticipated from, their parents, their friends, and the Police. This paper reported a thematic content analysis, guided by the framework of Akers' SLT, of small-group and individual interviews undertaken with male and female young novice drivers with Learner and Provisional driver's licences (research questions three and five). This research again informed the development of the survey instrument used in the remaining two research Stages. As such, Paper Four supports all five aims. It allowed a greater understanding of the nature and

extent of, and the psychosocial influences upon, the risky behaviour of the young novice driver, and in particular the influence of parents, friends, and the Police. The analyses were guided by a theoretical approach whilst examining the impact of some of the key components of the GDL program, such as mandated hours of practice. The findings suggested the development of targeted countermeasures such as general education campaigns emphasising the need for parents and friends to not only demonstrate safe driving behaviour, but to also encourage safe – and discourage unsafe – driving behaviour by the young novice, at all times.

4.4.5 Paper Five

Scott-Parker, B., Bates, L., Watson, B., King, M. J., & Hyde, M. K. (2011). The impact of changes to the graduated driver licensing program in Queensland, Australia on the experiences of learner drivers. *Accident Analysis and Prevention, 43,* 1301-1308. doi: 10.1016/j.aap.2011.01.012

Paper Five (Chapter Nine) was the first paper within Stage Two and was the second paper situated within the *behaviour* dimension of Bandura's RDM. It was the only paper that analysed data collected at Stage Two exclusively. It involved an examination of the experiences and behaviours of Learner drivers in Queensland's enhanced-GDL program (research question two). It is noteworthy that comparisons were also made with the experiences and behaviours of young novice drivers who gained their Learner driver's licence in the former-GDL program (pre-July 2007), utilising the data of Bates et al. (2010a, 2010b) and a matched (by residential postcode) sub-sample of the Stage Two drivers. Comparisons were conducted using t-tests and the Pearson chi-square test. The majority of Learners progressing through the enhanced-GDL program reported they did not engage in pre-Licence and unsupervised driving, and they submitted accurate logbooks. In addition, compared to Learners who progressed through the former-GDL program, Learners in the enhanced-GDL program reported less difficulty obtaining more hours of driving practice. Paper Five principally supports research aim three, examining the impact of key components of the GDL program introduced in Queensland in July 2007, not only through the cross-sectional analyses but incorporating comparisons with former-GDL Learners.

4.4.6 Paper Six

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (in press). Young, inexperienced and on the road – Do novice drivers comply with road rules? *Transportation Research Record.*

Paper Six (Chapter Ten) extended the focus of the research reported in Paper Five by examining the compliance of young novice drivers with both GDL-specific and general road rules. The *behaviour* (the third paper within this dimension of Bandura's RDM) of the novice drivers was examined at three time points: during the period before licensure (pre-Licence driving), the Learner period (Stage Two), and the first six months of the Provisional licence (Stage Three) (research questions one and two). In addition to the three cross-sectional measures using analysis of variance and the chi-square test analytical methods, a longitudinal exploration using Wilcoxon signed-rank tests and hierarchical multiple regression was undertaken. The personal characteristics of the drivers according to their self-reported compliance, and the driver's personal characteristics and behaviours associated with Provisional driver speeding, were also identified (research question four). This paper was pivotal in realising research aim three which seeks to examine the impact of key components of the GDL program introduced in Queensland in July 2007. Research aims two and five were also addressed by Paper Six, with improved measurement of the behaviour of young novice drivers which can inform the development of targeted countermeasures such as education regarding the importance, and enforcement, of compliance with GDL-specific and general road rules.

4.4.7 Paper Seven

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2011). Young and unlicensed: Risky driving before entering the licensing system. *Traffic Injury Prevention, 13*(3), 213-218. doi*:* 10.1080/15389588.2011.638683

Paper Seven (Chapter Eleven) was the fourth paper to examine the *behaviour* dimension of Bandura's RDM and built upon Paper Six (Chapter Ten) by more fully investigating the phenomenon of pre-Licence driving, a *behaviour* which involves young novices driving on the road *before* they have obtained a valid Learner driver's licence. This paper drew upon data regarding the incidence and frequency of pre-Licence driving which had been captured in the Learner Survey of Stage Two to further explore pre-Licence driving. Comparisons were made between the

participants' sociodemographic characteristics, Learner and Provisional driving behaviours, psychosocial characteristics and attitudes for those novices who reported pre-Licence driving and those who did not (research questions one, two and three), using Pearson chi-square and analysis of variance tests. Gender differences amongst the pre-Licence drivers were also examined. In addition, the research explored the predictors of the frequency of pre-licence driving using multinomial logistic regression techniques, comparing 'no pre-Licence driving' to '1-5 times' and '>5 times'. In addition to the cross-sectional analyses, a longitudinal exploration of the risky behaviour of young novices during the Learner and Provisional licence periods was undertaken for both non-pre-Licence and pre-Licence drivers alike. As such the paper aligns with research aims one, two, and five. It measured the risky behaviour of young novices within an enhanced GDL program, and explored the psychosocial influences (such as sensation seeking propensity) upon this risky driving behaviour. The paper also highlighted the need for countermeasures targeting parents and children *before* they obtain a Learner licence, including the need to encourage greater parental monitoring of pre-Licence car use. Further, the pre-Licence adolescent should be discouraged from on-road driving until they have a valid Learner licence and are suitably supervised.

4.4.8 Paper Eight

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2011). Mileage, car ownership, experience of punishment avoidance and the risky driving of young drivers. *Traffic Injury Prevention, 12*(6), 559-567. doi: 10.1080/15389588.2011.621000

Paper Eight (Chapter Twelve) was the fifth paper to examine the *behaviour* dimension of Bandura's RDM. Papers One, Five, Six and Seven (Chapters Five, Nine through Eleven) revealed the range and nature of risky driving behaviours young novice drivers reported performing; while Paper Four (Chapter Eight) reported the qualitative research undertaken in Stage 1B in which young novice drivers discussed their behaviour when using both their own and the family car, and attending to and avoiding Police presence on the road. Further, as discussed in Chapter Two, vehicle ownership (2.2.5.2) and exposure (2.2.4.3) have been found to be associated with more risky driving, more crashes and more offences. Therefore Paper Eight built upon the research findings obtained in the program of research to

this point by exploring the rates and role of car ownership and driving exposure (including duration, distance and consistency) in the risky driving of young novices (research questions one, three and five). In addition, the self-reported avoidance of potential Police punishment (by paying attention to the on-road locations of Police including enforcement operations, and then avoiding these locations) was also examined. Statistical analyses included Pearson's chi-square test, and comparison of means via analysis of variance, and the Kruskal-Wallis test. Most novice drivers reported that they paid attention to locations of on-road Police presence but that they did not avoid this presence. 'Avoiders' were significantly more likely to be male, to have previously talked themselves out of a ticket, to report greater sensation seeking propensity and reward sensitivity, and to engage in more risky driving behaviour. Paper Eight supported research aims one and five, with the paper contributing to a greater understanding of the risky driving behaviour of the young novice and the psychosocial influences upon this behaviour. Furthermore, the findings can inform the development of targeted countermeasures; for example, educating parents and young novices alike of the increased risk to the young novice driver who has unlimited car access in the earliest stages of their independent driving.

4.4.9 Paper Nine

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). A further exploration of sensation seeking propensity, reward sensitivity, depression, anxiety and the risky behaviour of young novice drivers in a structural equation model. *Accident Analysis and Prevention.* doi:10.1016/j.aap.2012.05.027

Paper Nine (Chapter Thirteen) was the third paper to examine Bandura's RDM *person* dimension, thereby building upon the two previous *person* papers (Papers Two, Three), and the first longitudinal methodology that reported the findings of Stages Two and Three. Papers Two and Three found psychological distress, sensation seeking propensity and reward sensitivity were predictive of risky driving in cross-sectional analyses. To further understand the nature and influence of these psychosocial constructs, the stability of sensation seeking propensity, reward sensitivity, anxiety, and depression was examined over a six-month follow-up period. Separate gender analyses were undertaken (research questions three and five). Structural equation modeling was used to examine the longitudinal nature of and the interrelationships between depression, anxiety, sensation seeking propensity

and reward sensitivity within the context of the risky behaviour of drivers with a Provisional licence, with the constructs measured in Stage Two (the Learner Survey) and Stage Three (the Provisional Survey). Paper Nine focused on research aims one, four and five, with the longitudinal exploration allowing unique insight into the nature and extent of the psychosocial influences upon the risky driving behaviour of young novices, enhancing the theoretical approach to exploring risky driving behaviour, and informing countermeasure development, such as mental health interventions for the relatively-stable experience of psychological distress, and the anticipated commensurate road-safety benefits

4.4.10 Paper Ten

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). Speeding by young novice drivers: What can personal characteristics, psychosocial theory, and prior behaviour add to our understanding? *Accident Analysis and Prevention.* doi: 10. 1016/j.aap.2012.04.010

Paper Ten (Chapter Fourteen) was the second paper to examine the *environment* dimension of Bandura's RDM and the first longitudinal paper that reports findings from all three stages of research. This paper was intended to build on a range of different components of the program of research including the previous *environment* paper (Paper Four), four *behaviour* papers (Papers Five, Six, Seven, Eight), the three previous *person* papers (Papers Two, Three, Nine), and again used the instrument (the BYNDS) developed in Paper One (research questions one, three and five). The research explored the influence of personal characteristics (age, gender, psychological traits and states, car ownership), and SLT (differential association, differential reinforcement, imitation, personal attitudes) augmented by elements of the PWM (prototypes, willingness, intentions, Learner speeding behaviour) upon the self-reported speeding of young novice drivers. Prior to the hierarchical multiple regressions (HMR), a measurement model of Akers' SLT was constructed using confirmatory factor analysis (CFA); 'safe' and 'unsafe' prototypes that were developed through small group interviews (Stage 1B) and exploratory factor analysis were finalised through CFA; and the speeding measure for both the Learner and the Provisional driver was validated through CFA. Separate HMR analyses for each gender were also performed. Accordingly given the comprehensive nature of Paper Ten, all five research aims were supported. Specifically, the

measurement of speeding by young novices with Learner and Provisional driver's licences was improved through the development of a speeding subscale captured within the BYNDS (originally developed in Paper One) and previously operationalised in Paper Six. In addition, the findings built upon those of Papers Two, Three, Four, Seven, Eight, and Nine in relation to the factors influencing speeding behaviour. Together, the research findings can inform the development of countermeasures targeting not only young novice drivers, but also their parents who were most commonly their supervisor and who therefore are instrumental in the development of the young novice driver.

4.4.11 Paper Eleven

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). Confirmatory factor analysis of the Behaviour of Young Novice Drivers Scale (BYNDS). *Accident Analysis and Prevention, 49,* 358-391. doi: 10.1016/j.aap.2012.02.021

Paper Eleven (Chapter Fifteen) was the final investigation of the *behaviour* dimension (Bandura's RDM) within the research program, and concludes the program of research by refining the structure of the instrument created in Paper One and operationalised throughout the research program. The 44-item BYNDS was developed through EFA using a matched-sample of novice drivers attending a *tertiary* institution. In comparison, Stage Three collected data regarding the risky behaviour of a *general* sample of young novice drivers, allowing an examination of the risky driving of young novices and of the psychometric properties of the original BYNDS (research questions one and four). A CFA was performed on the factor structure identified in Paper One, and a 36-item Revised BYNDS exhibiting good model fit was developed. The Revised BYNDS characteristics were examined and found to be highly associated with both the original BYNDS (sub)scales and driving intentions, moderately associated with self-reported crashes, and weakly associated with self-reported driving offences. Accordingly, Paper Eleven aligns with research aim two, contributing to the measurement of the risky behaviour of young novice drivers. Paper Eleven also aligns with research aim five, clusters of behaviours revealing avenues of intervention targeting the risky behaviour of young novice drivers.

4.5 Chapter summary

Chapter Four has provided an overview of the thesis-by-papers, positioning the 11 papers written during the three Stages of research within the framework of Bandura's RDM. Chapters Five through Fifteen contain these papers. Please note the reference lists have been removed from each paper and collated within one comprehensive reference list (Chapter Seventeen) as per Queensland University of Technology's thesis-by-publication requirements. Surveys and interview schedules that were used at each Stage are provided in the Appendices (Chapter Eighteen). Chapter Sixteen consists of a general discussion of the research findings, including the contribution of each paper to the research questions; the practical, theoretical and methodological implications of the research findings; the strengths and limitations of the research findings, and suggestions for future research directions.

Chapter Five: The Risky Behaviour of Young Drivers: Developing a Measurement Tool

5.1 Notes

Taken from:

Scott-Parker, B., Watson, B., & King, M. J. (2010). The risky behaviour of young drivers: Developing a measurement tool. In *Proceedings of the 20th Canadian Multidisciplinary Road Safety Conference, Niagara Falls, Ontario, June 6-9 2010.*

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas and arguments(s), interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online survey and the analysis of the data collected. The second and third authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

The paper was peer-reviewed as a condition of their inclusion in the Conference Proceedings for the 20th Canadian Multidisciplinary Road Safety Conference. The paper is recognised for the Higher Education Research Data Collection (HERDC), and the author retains publication rights.

This paper is the first paper in the program of research, and the first paper to explore the *behaviour* dimension of Bandura's RDM. It introduces the methodology of Stage 1 and is fundamental to the remainder of the research comprising this thesis. It reports the procedure undertaken to develop the instrument designed specifically to measure the risky behaviour of young novice drivers. This tool – in part or in its entirety – is operationalised in 9 of the remaining 10 papers.

5.2 Abstract

The contribution of risky behaviour to the increased crash and fatality rates of young novice drivers is recognised in the road safety literature around the world. Exploring such risky driver behaviour has led to the development of tools like the Driver Behaviour Questionnaire (DBQ) to examine driving violations, errors, and lapses (Reason et al., 1990). Whilst the DBQ has been utilised in young novice driver research, some items within this tool seem specifically designed for the older, more experienced driver, whilst others appear to asses both behaviour and related motives. The current study was prompted by the need for a risky behaviour measurement tool that can be utilised with young drivers with a provisional driving licence. Sixty-three items exploring young driver risky behaviour developed from the road safety literature were incorporated into an online survey. These items assessed driver, passenger, journey, car and crash-related issues. A sample of 476 drivers aged 17-25 years (M = 19, SD = 1.59 years) with a provisional driving licence and matched for age, gender, and education were drawn from a state-wide sample of 761 young drivers who completed the survey. Factor analysis based upon a principal components extraction of factors was followed by an oblique rotation to investigate the underlying dimensions to young novice driver risky behaviour. A five factor solution comprising 44 items was identified, accounting for 55% of the variance in young driver risky behaviour. Factor 1 accounted for 32.5% of the variance and appeared to measure driving violations that were transient in nature - risky behaviours that followed risky decisions that occurred during the journey (e.g., speeding). Factor 2 accounted for 10.0% of variance and appeared to measure driving violations that were fixed in nature; the risky decisions being undertaken before the journey (e.g., drink driving). Factor 3 accounted for 5.4% of variance and appeared to measure misjudgement (e.g., misjudged speed of oncoming vehicle). Factor 4 accounted for 4.3% of variance and appeared to measure risky driving exposure (e.g., driving at night with friends as passengers). Factor 5 accounted for 2.8% of variance and appeared to measure driver emotions or mood (e.g., anger). Given that the aim of the study was to create a research tool, the factors informed the development of five subscales and one composite scale. The composite scale had a very high internal consistency measure (Cronbach's alpha) of .947. Self-reported data relating to police-detected driving offences, their crash involvement, and their intentions to break road rules within the next year were also collected. While the

composite scale was only weakly correlated with self-reported crashes ($r = .16$, $p < .001$), it was moderately correlated with offences ($r = .26$, $p < .001$), and highly correlated with their intentions to break the road rules ($r = .57$, $p < .001$). Further application of the developed scale is needed to confirm the factor structure within other samples of young drivers both in Australia and in other countries. In addition, future research could explore the applicability of the scale for investigating the behaviour of other types of drivers.

5.3 Introduction

5.3.1 The crashes of young novice drivers

Young novice drivers constitute a major public health concern in terms of their numbers of crashes, their rates of crash involvement, and the injuries and fatalities arising from those crashes (Doherty et al., 1998). For example, persons aged 15-24 years contributed more than 1 in 4 of all crash fatalities in OECD countries in 2004 whilst only constituting 1 in 10 of the population (OECD, 2006). Moreover, in Queensland in 2008, nearly one in three road fatalities involved a young driver (DTMR, 2009). It is therefore important to understand and, if possible, address the factors which contribute to this problem. Road safety research consistently demonstrates that young driver crashes and fatalities are influenced by numerous driver, passenger, journey, vehicle, and crash variables that interact, and these are summarised below.

Driver characteristics found to influence young driver crash and fatality rates include inexperience (Keating, 2007), gender (i.e. being male) (DITRDLG, 2009), driving unlicensed (Harre et al., 1996), drink/drug driving (Asbridge et al., 2005; Fergusson et al., 2008), driving while fatigued, not using safety features such as seat belts (Queensland Transport, 2005a) and driving while distracted by passengers or in-car technology (Caird et al., 2008; Ferguson, 2003; Gugerty et al., 2004). Carrying young *passengers* (especially males carrying young males) presents a pronounced risk for both the young drivers and their passengers (Evans, 1991; Lam et al., 2003), especially when alcohol and distraction by passengers are also involved (Heck & Carlos, 2008). While the relationship to crashes is unclear, it is known that young drivers are prone to emotional driving (Mesken et al., 2007) and, due to their developmental stage, increased risk-taking behaviour and vulnerability to negative peer influences (Steinberg, 2008).

The *journey characteristics* found to be associated with young driver crashes and fatalities include speeding behaviour, which is both more common and more risky among young drivers compared with older drivers (ATSB, 2004a; Lam, 2003b). Driving in darkness is more risky for young drivers (Yannis et al., 2008), as is driving on weekends, and journeys at these times combine several risk factors: young drivers are more likely to carry young passengers at night and on weekends, and greater crash risk at these times, predisposition to risky driving, and limited

driving experience (ATSB, 2004a; Doherty et al., 1998), are exacerbated by fatigue, drink driving, and recreational driving (Williams, 2003).

Some of the *vehicle and crash characteristics* found to be associated with young driver crash and fatality rates include the size and age of the vehicle, with smaller and older cars being over-involved and associated with higher risk of fatality (Bedard et al., 2002; Williams & Wells, 1995). Young drivers are more likely to rear-end shunt the car in front, inaccurately negotiate a curve, and be involved in an accident as they try to turn across traffic than older, more experienced drivers (Kweon & Kockelman, 2003). Gender contributes to crash type as well, as loss-of-control crashes are twice as likely for male as female young drivers, and are three times more likely to be fatal (Tavris et al., 2001).

As can been seen, the key themes of the behaviours of young novices that contribute to risky driving relate to when they drive, how they drive and who they drive with, so that even apparently "non-human" factors such as type of journey and type of vehicle driven involve choices made by young drivers.

5.3.2 Measuring the risky behaviour of young drivers

A wide variety of research methods have been used to investigate the characteristics of the young novice driver, including

- focus groups (Ramos et al., 2008);
- questionnaires and surveys via telephone (Porter & Berry, 2001), paper-and-pencil, internet, and interview with closed and open-ended questions (Harre et al., 2004);
- logbook analyses (Harrison, 2004);
- longitudinal (Vassallo et al., 2007) and cross-sectional studies that frequently use data from police (McKnight & McKnight, 2003), insurance (Cooper, Pinili, & Chen, 1995), crash reports, hospital records (Learner et al., 2001), convictions, red light and speed camera photographs (Yang & Najm, 2007);
- local, state, and national crash reporting databases of driving exposure and injuries and fatalities from car crashes (McCartt et al., 2003);
- case-control (Lam et al., 2003), crash responsibility analysis (Vollrath, Meilinger, & Kruge, 2002) and crash reconstructions (Kloeden et al., 2001);
- objective measures and subjective estimates for factors such as alcohol

intoxication; self-reported behaviour (Scott-Parker et al., 2009a, 2009b) and simulated (Schwebel et al., 1997) and naturalistic observations (Rosenbloom, Perlman, & Shahar, 2007).

This road safety research, however, appears to haphazardly utilise a broad range of purpose-built scales of various types and sizes attempting to explore the constructs of research interest (e.g., two items exploring alcohol and driving among secondary students in New Zealand (DITRDLG, 2009); and 43 items in the Speeding Perception Inventory, formulated for use with an American University student driving population (Gabany, Plummer, & Grigg, 1997).

In contrast, the behaviours of older, more experienced drivers are frequently investigated via the Driver Behaviour Questionnaire (DBQ). The DBQ was designed to measure driver errors, lapses, aggressive violations and highway code violations (Cronbach's alpha of .69 for errors, .75 for lapses, and .81 for violations, Xie & Parker, 2002) via 28 items. Numerous studies have examined the factor structure of the DBQ within a range of countries (Aberg & Rimmo, 1998; Ozkan, Lajunen, Chliaoutakis, Parker, & Summala, 2006) and acceptable measures of internal consistency have been found in recent Australian research (Davey et al., 2007). Whilst this measurement tool has been utilised in young driver research (e.g., in Brazilian students, Bianchi & Summala, 2004; and in Israeli secondary and tertiary students, Taubman-Ben-Ari et al., 2005), the DBQ does not appear suited for specifically exploring the behaviours of young drivers.

To illustrate, a number of items combine both behaviour and related motives, for example item 16 (a highway code violation) asks the participant how often they "race away from the traffic lights with the intention of beating the driver next to you?" Such questions combine two constructs – behaviour and motivation – and therefore it may be unclear which concept the item is measuring. Moreover, whilst the young novice driver may indeed frequently ' "race away from the traffic lights" ' it is unlikely that will be because he or she wants to beat the driver next to him or her each time. Young novice driver road safety research ultimately seeks to inform countermeasure development and government road use policy, and to do so this research needs to report clear findings obtained through the use of concise measures. In addition, some items in the DBQ appear suited to the older, rather than the younger, driver. For example, the lapse item "how many times did you forget where you left your car in the car park?" is unlikely to be relevant to many young novice

drivers who perceive their car as a significant part of their identity (Fraine, Smith, Zinkiewicz, Chapman, & Sheehan, 2007).

5.3.3 The study

There is a need for a reliable and valid measure of young novice driver behaviour containing a more comprehensive range of behaviours that have been identified as contributing to young novice driver crashes. It is vital that this tool be drawn from the breadth of behaviours apparent in the young driver crash characteristics already identified in the road safety literature and discussed earlier. This study is part of a larger study undertaken in Queensland, Australia designed to explore the risky behaviour of young novice drivers. In Queensland, young novice drivers progress through a multiphase graduated driver licensing (GDL) system of Learners (under full supervision for one year; must be 16 years old), Provisional P1 (with various driving restrictions; must be held for at least one year if under 24), Provisional P2 (with various driving restrictions; must be held for two years if under 25, one year otherwise), and Open licence (full driving privileges). An online survey was informed by the young driver literature. The aim of the present study was to identify the behavioural dimensions underlying risky young novice driving, and to create scale(s) representing these dimensions.

5.4 Method

5.4.1 Participants

Seven hundred and sixty-one drivers (523 women and 238 men) aged 17-25 years (M = 19 years, SD = 1.59) with a provisional driving licence (281 P1, 480 P2) volunteered to complete the 25 minute online survey. Given the greater participation of female young drivers, a sub-sample was randomly selected that matched the male young driver participants upon the demographic measures of age and the geographic and socioeconomic measure of the educational institution they attended to address the possibility of bias. The matched participants sample was comprised of 238 male and 238 female young drivers aged 17-25 years with a provisional driving licence (166 P1, 310 P2). Two hundred and twenty-eight of the participants were students of the Queensland University of Technology (QUT), 230 were students of the University of Queensland (UQ), and 18 were students of the Technical and Further Education (TAFE) Colleges of Queensland.

5.4.2 Procedure and the survey instrument

The study featured a cross-sectional survey design. The online survey was distributed to all tertiary education institutions in Queensland, Australia, and available online from mid-August to 30 October, 2009. Students aged 17-25 years with a provisional driving licence were eligible to participate for the opportunity to receive one of four $350 fuel vouchers; if they were a first-year psychology undergraduate student at QUT they were eligible for certified credit for study participation. Participants were asked a range of sociodemographic questions, including age, gender, and marital status. They were instructed to think about their driving experiences whilst on a provisional driving licence. The young drivers then rated their agreement with 63 items derived from the literature including Queensland's GDL provisions. Participants also responded to items asking if they had ever been in a car crash as a driver (*yes*, *no*), been caught by police for committing a driving offence (*yes*, *no*), and if they were likely to bend any road rules, including GDL provisions, over the next year (1 *definitely will not* to 7 *definitely will*). The online survey tool was created and distributed in the KeySurvey Enterprise Online Survey Software program. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 16.0.

5.4.3 Statistical analysis

A minimum sample size of 5 observations per variable is recommended for exploratory factor analysis (EFA), and for a preferred power of 80% and to detect a medium effect size of .20, a sample size of 315 participants is required with a minimum of .30 as a significant factor loading (Hair, Anderson, Tatham, & Black, 1998). This sample size requirement was met. Bivariate correlations were used to explore the strength of association between the factors and the sociodemographic variables, and the risky behaviour measures of crash involvement, offence detection, and intentions to comply with rules. Bivariate correlations between continuous variables utilised Pearson's product moment correlation (r); bivariate correlations between continuous and dichotomous variables utilised point biserial correlations (r_{pb}); and bivariate correlations between dichotomous variables utilised the phi coefficient (ϕ) (Cohen, 1996). These were evaluated at a significance level of $\alpha = .05$.

5.5 Results

An exploratory factor analysis of the 63 self-reported behaviour items with principal component extraction identified 12 factors with eigenvalues greater than 1.00 explaining 62.25% of variance; 3 factors explaining more than 4% of variance each; and 5 factors according to the scree test. The Kaiser-Meyer-Olkin measure of sampling adequacy was acceptable at .921, and the Bartlett's test of sphericity was significant at $p < .001$. Given that the factors were likely to be correlated, an oblique promax rotation with Kaiser Normalisation was undertaken. The most interpretable solution emerged from using five factors. Considering that (a) as the number of factors extracted increases, the factor loadings considered significant should also increase; (b) larger factor loadings correspond to more variance in the item being explained by the factor (e.g., a .40 factor loading corresponds to 16% of the item's variance being accounted for by that factor), and (c) that factor loadings greater than .40 are considered "more important" (Hair et al., 1998), items that did not load above .40 upon any factor and those that loaded highly on two or more factors were excluded (see Appendix F). The factor analysis with promax rotation of the remaining 44 items revealed an easily interpretable five factor structure, explaining 55% of the variance in young provisional risky driving behaviour as depicted in Table 5.1.

Factor 1 contained 13 items and accounted for 32.5% of variance and appeared to measure driving violations that were transient in nature, i.e. violations that drivers can perform multiple times during a journey (e.g., speeding). Factor loadings ranged from .41 to .91, the majority of which were greater than .60. Factor 2 contained 10 items and accounted for 10.0% of variance and appeared to measure driving violations that were more fixed in nature, i.e. violations that apply throughout the journey (e.g., drink driving). Factor loadings ranged from .47 to .83, again the majority of which exceeded .60. Factor 3 contained nine items and accounted for 5.4% of variance and appeared to measure misjudgement (e.g., misjudging the speed of an oncoming vehicle). Factor loadings ranged from .47 to .83, two thirds of which were greater than .60. Factor 4 contained nine items and accounted for 4.3% of variance and appeared to measure potentially risky driving exposure (e.g., driving at night with friends as passengers). Factor loadings ranged from .42 to .82, more than half exceeding .60. Factor 5 contained three items and accounted for 2.8% of variance and appeared to measure driver emotions or mood

Table 5.1 Items and factor loadings for each item in the Behaviour of Risky Young Drivers Scale (BYNDS)

Item	F1	F2	F3	F4	F5
You drove over speed limit in areas where it was unlikely there was a radar or speed camera	.91				
You went 10-20 km/hr over the speed limit (e.g., 72 km/hr in a 60 km/hr, 112 km/hr in a 100 km/hr)	.83				
You deliberately sped when overtaking	.83				
You sped at night on roads that were not well lit	.81				
You went up to 10 km/hr over the speed limit (e.g. 65 km/hr in a 60 km/hr, 105 km/hr in a 100 km/hr)	.79				
You went more than 20 km/hr over the speed limit (e.g. 60 km/hr in a 40 km/hr, 100 km/hr in an 80 km/hr)	.79				
You raced out of an intersection when the light went green	.74				
You travelled in the right lane on multi-lane highways	.65				
You sped up when the lights went yellow	.64				
You went too fast around a corner	.56				
You did an illegal u-turn	.50				
You overtook a car on the left	.48				
You spoke on a mobile that you held in your hands	.41				
Your passengers didn't wear seatbelts		.83			
You drove after taking an illicit drug such as marijuana or ecstasy		.80			
You carried more passengers than could legally fit in your car		.78			
You didn't always wear your seatbelt		.75			
You drove without a valid licence because you hadn't applied for one yet or it had been suspended		.75			
You didn't wear a seatbelt if it was only for a short trip		.69			
If there was no red light camera, you drove through intersections on a red light		.68			
You carried more passengers than there were seatbelts for in your car		.65			
You drove when you thought you may have been over the legal alcohol limit		.49			
You drove a high-powered vehicle		.47			
You misjudged the speed when you were exiting a main road			.83		
You misjudged the speed of an oncoming vehicle			.78		
You misjudged the gap when you were turning right			.71		
You misjudged the stopping distance you needed			.70		
You turned right into the path of another vehicle			.62		

Table 5.1 (Continued)

Item	F1	F2	F3	F4	F5
You misjudged the gap when you were overtaking another vehicle			.61		
You missed your exit or turn			.59		
You entered the road in front of another vehicle			.54		
You didn't always indicate when you were changing lanes			.47		
You drove on the weekend				.82	
You drove in the rain				.80	
You drove at peak times in the morning and afternoon				.78	
You drove at night				.78	
You drove at dusk or dawn				.70	
You carried your friends as passengers at night				.55	
You drove when you knew you were tired				.43	
Your car was full of your friends as passengers				.42	
You went for a drive with your mates giving directions to where they wanted to go				.42	
Your driving was affected by negative emotions like anger or frustration					.85
You allowed your driving style to be influenced by what mood you were in					.80
You drove faster if you were in a bad mood					.79

(e.g., anger). Factor loadings ranged from .79 to .85.

The factors informed the development of five provisional subscales and one composite scale. Table 5.2 shows the correlations between the factors and the composite measure. As can be seen the strongest associations were between Factors 1 and 4, and Factors 1 and 5, indicating that transient rule violations were highly associated with greater risky driving exposure and driver mood. That is, the young novice driver was more likely to report breaking the road rules during the journey if they were travelling under higher risk circumstances (e.g., they were tired or were carrying their friends as passengers), and if they were in a bad mood. The associations between Factors 4 and 2, and Factors 4 and 3, were weakest, indicating that risky driving exposure was least related to fixed rule violations and misjudgement.

The composite scale had a very high internal consistency Cronbach's alpha (.947), and the subscales of Factors 1 to 5 were similarly high (.923, .846, .870, .869, and .891 respectively). Table 5.3 depicts the means, standard deviations, number of items, and the range for the subscales and composite scale. Overall, the young

Table 5.2 Correlations between factors and the composite provisional measure

	Factor 1 (Trans)	Factor 2 (Fixed)	Factor 3 (Misjdg)	Factor 4 (Expos)	Factor 5 (Emotn)	Risky Behavr. Compste.
Factor 1	1	-	-	-	-	-
Factor 2	.53	1	-	-	-	-
Factor 3	.53	.55	1	-	-	-
Factor 4	.63	.33	.31	1	-	-
Factor 5	.61	.40	.52	.45	1	-
Composite	.92	.69	.70	.76	.71	1

Note: All correlations were significant, $p < .001$.

drivers reported a large amount of risky driving exposure (average score per item in the scale = 2.90), a moderate amount of transient rule violations (2.08) and driving in response to their mood (1.87), and some misjudgement (1.51) and fixed rule violations (1.24).

Table 5.3 Characteristics of the provisional behaviour factors

Provisional Behaviour Measure	*M*	*SD*	No. of items	Range
Transient rule violations (Factor 1)	27.06	9.61	13	13 – 65
Fixed rule violations (Factor 2)	12.44	4.10	10	10 – 50
Misjudgement (Factor 3)	13.61	4.18	9	9 – 45
Risky driving exposure (Factor 4)	26.11	6.31	9	9 – 45
Driver mood (Factor 5)	5.60	2.63	3	3 – 15
Risky Driving Behaviour (Composite)	84.82	21.28	44	44 – 220

Table 5.4 illustrates the correlations between the risky behaviour measures and sociodemographics (age, gender, and type of provisional licence), crashes, offences and intentions to bend the road rules in the next year. One hundred and thirty-seven (28.8%) of the participants reported they had previously been involved in a car crash, and 101 (21.2%) had been caught committing a driving offence. As shown in Table 5.4, while the risky driving composite scale was only weakly associated with self-reported crashes, it was moderately associated with offences, and highly associated with participants' intentions to bend the road rules. One in six of the young novice drivers reported they would, or definitely would, whilst 4 in 10 reported they would not or definitely would not, bend the road rules in the next year. Of the five factors, transient rule violations (Factor 1) was most highly associated

with intentions to bend road rules and involvement in a crash, whilst both transient (Factor 1) and fixed rule violations (Factor 2) were most highly associated with offences.

Table 5.4 Correlations between the provisional risky behaviour measures and sociodemographics, self-reported crashes and offences, and driving intentions

Variable	Factor 1 (Trans.)	Factor 2 (Fixed)	Factor 3 (Misjudg.)	Factor 4 (Expos.)	Factor 5 (Emotn.)	Risky Behaviour Composite
Age	-.05	.05	.02	-.05	-.04	-.04
Gender	-.11*	-.17*	.03	.09*	.05	-.03
Licence	.07	.00	.06	.13**	.07	.09*
Offences	.24***	.29***	.16**	.17***	.14**	.26***
Crashes	.13**	.11*	.10*	.13**	.15**	.16**
Intentions	.62***	.38***	.33***	.34***	.38***	.57***

Note: * $p < .05$, ** $p < 01$, *** $p < .001$.

5.6 Discussion

5.6.1 Psychometric implications

As was discussed earlier, young driver road safety research has occasionally utilised the DBQ to provide a measure of self-reported risky driving. This may have been due to a lack of a suitable alternative that specifically explores the risky behaviour of young and novice drivers. The study offers one such alternative. It is interesting to note however the similarities of the composite scale to the DBQ. To illustrate, the DBQ contains three factors – errors, lapses, and violations, the latter which was subsequently dichotomised as aggressive violations and highway code violations. The risky behaviour composite herein referred to as the BYNDS (the Behaviour of Young Novice Drivers Scale) contains 5 factors – misjudgement (which may reflect the dimension of 'errors' within the DBQ), transient and fixed violations (which may parallel highway code violations), risky driving exposure (which may be particular to the young novice driver) and mood (which may reflect the causal mechanism underpinning some aggressive violations). Importantly, the study further delineates some more specific young driver risky behaviours. For example, the DBQ highway code violation item "cross a junction knowing that traffic lights have already turned against you" is examined by two study items that load on two different factors: "sped up when the lights went yellow" (transient

violation) and "if there was no red light camera, you drove through intersections on a red light" (fixed violation).

Studies utilising the DBQ frequently omit the errors items as researchers report that errors are not predictive of road crashes. However young drivers are novices, and as such errors – or in the case of the present study, misjudgement – are more likely to play a role. To illustrate, young drivers with a provisional licence involved in a crash in Queensland between 1 July 1998 and 30 June 2008 were at fault in 78% of their crashes (DTMR, 2010a). It is also noteworthy that the subscales identified in the present study exhibit higher internal consistency than those typically found for the DBQ. Furthermore, whilst there were weak correlations between the composite scale and self-reported involvement in a crash, crashes are comparatively infrequent events (Hatakka et al., 1997) and this does not diminish the potential utility of the tool (although it highlights the need for further refinement).

5.6.2 Practical implications

There are considerable practical implications arising from the study. Not only has a reliable and potentially valid measurement tool for young driver risky behaviour been created, but the five subscales of transient and fixed rule violations, misjudgement, risky exposure and driver mood have also been developed and could be used as independent measures. Accordingly road safety researchers can utilise the entire behaviour scale, one of the five subscales, or any combination of these subscales within their research. In addition, all risky behaviour factors were moderately associated with car crashes; therefore these can inform young novice driver countermeasure evaluations and government policy. To illustrate, the relationship with transient and fixed rule violations indicates that enforcement and education campaigns targeting risky behaviours such as speeding and drink driving may prove beneficial. Similarly misjudgement, which may reflect the driving experience and developing hazard detection skills of the young driver, may similarly benefit from targeted education in the learner phase of licensing. The considerable role of risky driving exposure indicates that graduated driver licensing restrictions may need to be strengthened. Education campaigns targeting the young novice driver could emphasise the greater risk associated with this exposure, and also the greater risk associated with driving in response to their mood particularly if they are angry or excited.

5.6.3 Strengths and limitations

The study used an adequate sample size for the exploratory factor analysis and controlled for gender (and socioeconomic) effect by matching a sub sample of novice drivers by age and educational institution. The items utilised in the study were drawn directly from the road safety literature and reflected the graduated driver licensing restrictions in Queensland. These items can also be easily modified for use in populations outside Australia; for example, travelling at "10-20 km/hr over the speed limit" can be readily converted to miles, travelling in the "right-hand lane" easily converted to "left-hand lane". The data used in the study were collected via self-report and may have been subject to biases inherent in this technique. However the anonymous nature of the questionnaire and the lack of consequences for reporting risky driving behaviour hopefully minimised this potential (Zhao et al., 2006). In addition, whilst it is preferable that the scales and subscales be internally consistent, indicated by a high Cronbach's alpha, such high alphas may suggest there is some redundancy within the instrument (Hair et al., 1998).

The generalisability of the study findings is limited by the survey procedure and method and the number and type of participants sampled. The survey tool was an online survey that was made available to all enrolled students at tertiary education institutions only, and therefore the sample may not be representative of all young novice drivers in Queensland. Unfortunately 4 out of 13 institutions declined to participate or did not respond to the participation request; therefore the respondents may not accurately represent young novice drivers attending a tertiary education institution in Queensland. In addition, the response rate for the study could not be calculated as it was not possible to determine how many young novice drivers accessed the survey and declined to participate. Furthermore, more female than male young novice drivers completed the survey (31.3% male, 68.7% female), and these ratios appear to reflect a greater participation of female young drivers as both UQ and QUT report that in 2009 55% of their student population were female.

5.6.4 Future research

Future research provides an opportunity to further explore the reliability of the BYNDS and its subscales, particularly the refining of each scale by determining the optimal number of items within each, thereby improving its parsimony. This research could incorporate additional survey modes, such as paper and pencil tests,

or telephone interviews, and also incorporate the capacity to appraise both the response rates and participant biases pertaining to each data collection method. Future samples should include young novice drivers who are not tertiary education students. There is a need to further examine the validity and reliability of the BYNDS by establishing its relationship with other measures of risky behaviour, for example using simulator studies, diary studies, and official crash and offence records. A longitudinal methodology may also allow identification of developmental changes in the risky behaviour of young novice drivers, particularly as they progress from their Learner licence to their P1, their P2, and ultimately to their Open licence. This approach may also inform countermeasure development that may need to target particular groups of young drivers. Future studies could also compare the explanatory and predictive ability of the BYNDS with the DBQ, including examination of the identified factor structure of the items in other young driver populations around the world.

5.7 Conclusions

Young driver risky behaviour contributes to their increased car crash and fatality rates in Queensland and in other jurisdictions around the world. A range of contributing factors has been identified by road safety researchers utilising multiple methods and these relate to the way young people drive, who they drive with and when they drive. This study recognised the need for a reliable and valid tool that can measure the self-reported risky behaviour undertaken by the novice young driver. Accordingly an online survey was completed by 761 young drivers, and exploratory factor analysis using a sub-sample of 476 (equal numbers of males and females, matched) resulted in a 5-factor solution. The factors include transient and fixed violations, misjudgement, risky driving exposure, and driver emotion and mood. The factors informed the development of one composite scale and five subscales, each with very high internal reliability. The composite scale or any combination of subscales can be used in future young novice driver research, and may prove suitable for research involving older, more experienced drivers as well.

5.8 Chapter summary

Chapter Five has reported the methodology used to create a reliable and valid instrument that can consistently measure the self-reported risky behaviour of young

novice drivers. The instrument – the Behaviour of Young Novice Drivers (BYNDS) – is listed in the American Psychological Association's PsycTests. The items, and subscales guide, are provided in Appendix G. The BYNDS features in 9 of the 10 remaining papers comprising this thesis-by-publication. The next chapter, Chapter Six, is the first application of the BYNDS as a measure of self-reported risky driving behaviour. The influence of the psychological distress experienced by the young novice driver upon their self-reported risky driving behaviour is examined.

Chapter Six: The Psychological Distress of the Young Driver: A Brief Report

6.1 Notes

Taken from:

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2011). The psychological distress of the young driver: A brief report. *Injury Prevention, 17,* 275-277. doi: 10.1136/ip.2010.031328.

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas and arguments, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online survey and the analysis of the data collected. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

The journal in which this paper was published is a peer-reviewed journal with international readership. In addition, the journal placed an embargo upon the article which was lifted at the time of the global media release on 16th May 2011. The journal is listed in the Social Sciences Citation Index and recognised for the Higher Education Research Data Collection (HERDC). The Impact Factor for this journal is 1.504. The publisher of this article (BMJ Group) states that authors retain the right to publish their work in a thesis.

This paper is the first exploration to explore the *person* dimension of Bandura's RDM. The instrument developed in the previous paper – the BYNDS – is utilised in the analyses to explore the influence of psychological distress (experienced as anxiety and depression) upon the self-reported risky driving behaviour of young novices. The research findings inform the remainder of the research program.

6.2 Abstract

Objective: To explore the role of psychological distress in the self-reported risky driving of young novice drivers.

Design: Cross-sectional online survey of 761 tertiary students aged 17-25 years with an intermediate (Provisional) driving licence who completed Kessler's Psychological Distress Scale and the Behaviour of Young Novice Drivers Scale.

Setting: Queensland, Australia, August-October 2009.

Main outcome measures: Psychological distress, risky driving.

Results: Regression analyses revealed that psychological distress uniquely explained 8.5% of the variance in young novice's risky driving, with adolescents experiencing psychological distress also reporting higher levels of risky driving. Psychological distress uniquely explained a significant 6.7% and 9.5% of variance in risky driving for males and females respectively.

Conclusions: Medical practitioners treating adolescents who have been injured through risky behaviour need to aware of the potential contribution of psychological distress, whilst mental health professionals working with adolescents experiencing psychological distress need to be aware of this additional source of potential harm. The nature of the causal relationships linking psychological distress and risky driving behaviour are not yet fully understood, indicating a need for further research so that strategies such as screening can be investigated.

6.3 Introduction

In Queensland, Australia, in 2008, 13% of licensed drivers were aged 17-24 years, however they represented 22.3% of all road fatalities and were involved in 29.9% of crashes in which someone was fatally injured (DTMR, 2009). Risky driving behaviour contributes to crashes involving young novice drivers. Accordingly the nature and breadth of external and internal influences upon the risky driving behaviour of these young drivers is increasingly considered. This brief report investigated the psychological distress of the young driver.

The cognitive, physiological, behavioural and social maturation of young people is frequently associated with psychological distress such as depression and anxiety, and this can impact upon their driving behaviour (Dahl, 2008). The prevalence of depression in adolescence is approximately 24% (Avenevoli et al., 2008), with 1 in 10 adolescents being depressed at any given time (Strine et al., 2008). Depression and psychological distress have been associated with risky behaviours including unprotected sex (Swanholm et al., 2009), cigarette smoking and unsafe levels of alcohol consumption (Waller et al., 2006).

There is mixed evidence regarding the direction of the relationship between psychological distress and risky behaviour; some findings suggest distress emerges after risky behaviour (Waller et al., 2006), whilst others suggest risky behaviour occurs in response to distress (Suris, Michaud, Akre, & Sawyer, 2008). Research in Victoria, Australia, compared the self-reported levels of psychological distress for young drivers grouped as ‘low’, ‘moderate’ or ‘high’ risk drivers. Anxiety, but not depression, levels between ‘low’ and ‘high’ groups were significantly different (Vassallo et al., 2008). It was concluded that psychological distress was not related to risky driving. Participants rated the riskiness of five driving behaviours (e.g., speeding, not wearing seatbelts) within the last 10 journeys only, potentially masking their typical driving behaviour. New South Wales cohort research (Martiniuk et al., 2010) similarly found no relationship between psychological distress and subsequent crash involvement; however the two-year delay between the measures may have obscured any relationship (Ivers et al., 2006). Furthermore, road crashes are comparatively rare events and may not be a sensitive indicator of the extent to which risky behaviour has occurred.

Given the relationship between psychological distress and risky behaviour in adolescents (Strine et al., 2008; Suris et al., 2008; Swanholm et al., 2009; Waller et

al., 2006), and that adolescents with an intermediate driver's licence are able to drive unsupervised, this study explored the role of psychological distress in the risky behaviour of young novice drivers. It was hypothesised that level of psychological distress would significantly predict young drivers' self-reported risky behaviour, over and above sociodemographic variables associated with risky behaviour in other research (Scott-Parker et al., 2009a; Swanholm et al., 2009; Suris et al., 2008; Waller et al., 2006).

6.4 Method

6.4.1 Participants

Drivers (n = 761; 523 females) aged 17-25 years (M = 19, SD = 1.56) with a Provisional (intermediate) driver's licence[1] (281 P1, 480 P2) completed an online survey between August and October 2009.

6.4.2 Design and procedure

An anonymous cross-sectional online survey was distributed via email of the hyperlink to the Registrar of the 13 major tertiary education institutions in Queensland, Australia. Students aged 17-25 years with a Provisional driving licence were eligible to participate. Participants received entry into a prize draw for one of four $A350 fuel vouchers. Participants reported sociodemographic information (age, gender, licence type, university[2]; marital, study, employment status), and completed Kessler's Psychological Distress Scale (K10) (Kessler et al., 2002), a 10-item measure of non-specific psychological distress (i.e., for mood or anxiety disorder) (α = .91). The K10 items align well with Criterion A of the DSM-IV (TR) diagnoses of major depressive episode (Cairney et al., 2007) – higher scores correspond to greater probability the respondent meets criteria for DSM-IV (TR) or CIDI diagnosis (Andrews & Slade, 2001). Participants then rated their agreement with the 44-item Behaviour of Young Novice Drivers Scale (BYNDS) (Scott-Parker, Watson, &

[1] In Queensland, Australia, there are two phases to the Provisional (intermediate) driver's licence stage in the graduated driver licensing program. The novice must hold a Provisional 1 (P1) permit for a minimum duration of one year, followed by a Provisional 2 (P2) permit for a minimum duration of two years.

[2] While there are 13 major tertiary institutions in Queensland, four institutions declined to participate in the research. The variable "university" was dichotomised as approximately half the participants came from Institution 1.

King, 2010) (α = .95); higher scores indicated higher levels of risky driving behaviour.

6.4.3 Statistical analyses

Bivariate correlations were used to explore the strength of association between the K10, sociodemographics, and the BYNDS score. The sample required for hierarchical multiple regression (HMR) exceeded the minimum size of $n \geq 50 + 8m$ (m = number of independent variables) required for a preferred power of 80%, and to detect a medium effect size of .20 (Tabachnik & Fidell, 2006). The online survey was created using KeySurvey Enterprise Software. Analyses were conducted using SPSS 16.0.

6.5 Results

The K10 scores ranged from 10 to 49 (M = 19.47, SD = 7.02, median = 18, mode = 17). Using criteria that adjusts the K10 thresholds according to the greater psychological distress normatively experienced by adolescents (Huang et al., 2009) 69.5% experienced no or mild psychological distress (score < 21); 22.9% experienced moderate distress (score 21-30), and 7.6% experienced severe psychological distress (score > 31). There was a weak but significant correlation between the K10 and study status (fulltime students less distressed) and gender (females more distressed), and a moderate association between the K10 and risky driving behaviour (more distressed corresponds to more risky driving) (Table 6.1).

Sociodemographic variables were dichotomised prior to HMR: marital status [Single n = 451, Relationship n = 310], university [Institution 1 n = 392, Other Institutions n = 369], study status [Full-time n = 705, Other n = 56], employment status [Full-time n = 40, Other n = 721]). For the HMR, sociodemographics were entered in step 1, the transformed K10 score in step 2, and interactions between centred variables of age and psychological distress (older adolescents experiencing greater psychological distress, between gender and distress (females experiencing distress earlier and at greater levels (Avenevoli et al., 2008), and between the type of intermediate licence (as a measure of driving experience) and distress, in step 3. The overall model was significant, F (11, 749) = 8.73, p < .001 (Table 6.2). At the final step, significant predictors were age (older), licence (P2), and the K10 score (more psychological distress).

Table 6.1 Correlations between K10, sociodemographic and risky driving variables

Variable	Correlations	
	K10 score	Risky Driving Behaviour
Age[1]	.03	-.06
Gender[2]	.12**	-.02
Marital Status[2]	-.02	.05
Employment Status[2]	-.01	-.03
University[2]	-.05	-.05
Study Status[2]	.09*	.07
Licence Type[2]	.00	.09*
Risky Driving Behaviour[1]	.29***	1.00

Note:* $p < .05$, ** $p < 01$, *** $p < .001$. The Psychological Distress variable was logarithmically transformed to rectify violations of normality. [1] Bivariate correlations between continuous variables utilised Pearson's product moment correlation *(r)*. [2] Bivariate correlations between continuous and dichotomous variables utilised point biserial correlations (r_{pb}).

Separate HMR analyses for gender were conducted. The model explained a significant 13.7% of variance in risky driving behaviour for males and 10.2% for females. The K10 score uniquely accounted for 6.7% and 9.5% of the variance for males and females, respectively.

6.6 Discussion

The hypothesis was supported with the distress of the young drivers explaining 8.5% of variance in their risky driving after controlling for sociodemographics. Research continues to reveal that a range of personal characteristics including psychological states can influence driver behaviour and thus crash involvement, and this study provides support for considering the influence of psychological distress. In addition, the K10 has been used only once previously in a sample of young drivers (Ivers et al., 2006; Martiniuk et al., 2010), and this study provides support for such an application of the instrument.

The K10 is a reliable, inexpensive screening instrument that can be easily incorporated in community surveys (Kessler et al., 2002). Moreover, the apparent relationship between K10 scores and diagnoses of depression indicates that the instrument appears to identify young drivers who are at greater risk of distress, and therefore at greater risk on the road. Identifying at-risk individuals is vital (Paxton et al., 2007). Not only could interventions be tailored to target particular groups of at-

Table 6.2 Hierarchical multiple regression results for sociodemographic variables, psychological distress and interactions predicting self-reported risky driving behaviour

Variables	*B*	*SE*	B	*sr²*	*R²*	*Adj R²*	*ΔR²*
Step 1[a]							
Gender	-2.70	1.55	-.06				
Age	-1.43	0.48	-.11**	.011			
Marital Status	2.04	1.47	.05				
University	-1.43	1.43	-.04				
Study Status	5.05	3.25	.07				
Employment Status	-1.13	3.78	-.01				
Licence Type	4.43	1.52	.11**	.010			
					.027	.018	.027**
Step 2[b]							
Psychological Distress	41.99	4.93	.30***	.085	.112	.100	.085***
Step 3[c]							
Age-K10 Interaction	-.02	.07	-.01				
Gender-K10 Interaction	.09	.23	.01				
Licence-K10 Interaction	.21	.21	.04				
					.114	.101	.001

Note: * $p < .05$, ** $p < 01$, *** $p < .001$. The Psychological Distress variable was logarithmically transformed to rectify violations of normality. Results presented are those at the final step of analyses. [a] $F(7, 753) = 2.97$, $p < .01$. [b] $F(8, 752) = 11.90$, $p < .001$. [c] $F(11, 749) = 0.38$ $p = .77$

risk drivers, but also from a mental health perspective this may result in improved well-being for the adolescent young driver. The experiences of the adolescent influence the experiences of the adult, including the experience of psychological distress (Avenevoli et al., 2008). It seems reasonable to extend this notion to the adolescent's experiences of risky driving behaviour which has implications for all road users. However, participants in this study may not be representative of all young novice drivers, the research findings are preliminary, and definitive recommendations cannot be made without further research.

Strengths of the study include a popular mode of administration, sufficiently large sample and the use of reliable and valid measures applied to the immediate past experience of the drivers, which is important given the potential transience of psychological distress, and to address potential recall problems. Limitations of the study include the cross-sectional nature of the research, the reliance on self-report data, an overrepresentation of female participants, and non-random sampling of novices. Notwithstanding these limitations, the range of K10 scores (using the

original criteria) did not differ from those of a larger sample of Australian young novice drivers (Ivers et al., 2006; Martiniuk et al., 2010). Given that psychosocial development, driving experience and psychological distress are all presumed to change with age, longitudinal research would assist in understanding how the relationships between these variables and risky driving evolve. This research could also consider how distress relates to normative peer influences (Scott-Parker et al., 2010) and other adolescent risky behaviours such as unprotected sex and drug use (Waller et al., 2006) and intentional asphyxiation (Bernadet, 2010).

6.7 Conclusion

The psychological distress of a sample of young drivers as measured by the K10 was found to predict their risky driving; a contribution over and above that of sociodemographics. The research has implications not only for road safety researchers but also for medical and mental health professionals. The apparent relationship between K10 scores and diagnoses of depression (Furukawa et al., 2003) suggests that the instrument may identify young drivers who are at greater risk of distress, and therefore may be at greater risk on the road. Young persons presenting to medical and mental health professionals could be screened for current psychological distress, particularly if they have incurred injury through risky behaviour.

6.8 Chapter summary

Chapter Six reported the application of Kessler's psychological distress scale to explore the role of psychological distress in the self-reported risky behaviour of young novice drivers progressing through an enhanced GDL program in Queensland. The research utilised the BYNDS which was developed in the previous chapter, Chapter Five. The findings inform the research of the next paper, Chapter Seven, which further considers the influence of psychological distress in the self-reported risky driving of young novice drivers.

Chapter Seven: The Influence of Sensitivity to Reward and Punishment, Propensity for Sensation Seeking, Depression, and Anxiety on the Risky Behaviour of Novice Drivers: A Path Model

7.1 Notes

Taken from:

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). The influence of sensitivity to reward and punishment, propensity for sensation seeking, depression, and anxiety on the risky behaviour of novice drivers: A path model. *British Journal of Psychology, 103*(2), 248-267. doi: 10.111/j.2044-8295.011.02069.x.

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, arguments and hypotheses, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online survey and the analysis of the data collected. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

The journal in which this paper was published is a peer-reviewed journal with international readership. The journal is listed in the Social Sciences Citation Index and recognised for HERDC. TheImpact Factor for this journal is 2.172, and the 2010 ISI Psychology Multidisciplinary ranking is 16/120. The publisher of this article (Wiley Blackwell) states in their Author Services that "Contributors may use the articles in teaching duties and in other works such as theses."

This paper is the second to explore the *person* dimension of Bandura's reciprocal determinism model, operationalising the BYNDS which was developed within the first paper, Chapter Five. The research in this paper, Chapter Seven, further delineates the influence of psychological distress upon the risky behaviour of the young novice driver after it was found to be influential in the previous paper, Chapter Six. Importantly, the influence of the psychological states of anxiety and

depression are considered in conjunction with the psychological traits of reward sensitivity and sensation seeking propensity. Consistent with the two previous papers, separate gender analyses are also conducted.

7.2 Abstract

Young novice drivers are significantly more likely to be killed or injured in car crashes than older more experienced drivers. Countermeasures such as graduated driver licensing (GDL) which allow the novice to gain driving experience under less-risky circumstances have been found to reduce the incidence of their crashes which arise from risky driving behaviour. Such countermeasures do not however consider the psychological traits of the young novice driver. The relationships between gender, age, anxiety and depression, sensitivity to reward, sensitivity to punishment, sensation seeking propensity and novice risky driving behaviour were explored. Participants were 761 young drivers aged 17-24 years (M = 19.00, SD = 1.56) with a Provisional (intermediate) driver's licence who completed an online survey comprising age, gender, the Impulsive Sensation Seeking Scale, Kessler's Psychological Distress Scale, the Sensitivity to Punishment and Sensitivity to Reward Questionnaire, and the Behaviour of Young Novice Drivers Scale. Path analysis revealed that depression, sensitivity to reward and sensation seeking propensity predicted the self-reported risky driving behaviour of the young novice drivers. Gender was a moderating variable, with the anxiety level of female young novice drivers also being influential upon their risky driving behaviour. Sensitivity to reward and sensation seeking propensity were highly associated, measuring separate yet related constructs. Depression and anxiety were also highly associated. These associations were found for male and female novice drivers alike. Current interventions in young driver risky behaviour, such as GDL, do not directly consider the role of rewards and sensation seeking, or the mental health of the young person, in young driver risky behaviour. An approach which does take these variables into account may contribute to improved road safety outcomes for young and older road users alike.

7.3 Introduction

7.3.1 The young novice driver

Novice drivers in motorised countries are typically adolescents. They have a disproportionately high rate of involvement in road crashes, a phenomenon which remains even in the context of steadily-reducing crash rates for all drivers in recent years. Research has also shown that for each young driver fatally injured in a crash, another 1.3 persons on average are killed in the same crash (OECD, 2006). Between 1 July 1998 and 30 June 2008, there were 27 856 young drivers aged 16-24 years involved in a car crash in Queensland, Australia. Seventy percent of the young drivers with an intermediate Provisional driver's licence were deemed to be at-fault in these crashes, compared to 58% of drivers with a full Open driver's licence. Over half of these crashes resulted in injury or fatality to the young driver, and two thirds of the drivers killed were male even though there are similar numbers of male and female young drivers. Young novice male drivers were also more likely to be at fault than females (DTMR, 2010a).

A number of characteristics of the young novice driver have been found to place them at higher risk of injury or death from a car crash. These include their still-maturing brain (Steinberg, 2008) and a propensity for undertaking risky behaviour (Jonah, 1997) which is normative during adolescence (Bonino et al., 2003); an overestimation of skills combined with an underestimation of risks (Weinstein, 1980) and underdeveloped hazard perception skills (Borowsky et al., 2010); and driving in risky conditions (Hasselberg & Laflamme, 2009) such as under the influence of drugs and alcohol and whilst not wearing a seatbelt. Young novice drivers are also influenced by the attitudes and behaviours of their parents and their peers (Scott-Parker et al., 2009a, b). Specifically, risky driving modelled by parents is likely to be imitated by the young novice (Taubman-Ben-Ari et al., 2005) and young drivers report feeling pressured to comply with requests for risky behaviour by their peer passengers (Regan & Mitsopoulos, 2001).

7.3.2 Interventions targeting risky young novice driver behaviour

Numerous countermeasures to risky young novice driver behaviour have been developed and implemented around the world, including media campaigns, driver education and training, in-car technologies, and licensing programs such as graduated driver licensing (GDL). Media campaigns traditionally utilise fear-based

approaches (Lewis et al., 2009) and have not been found to be effective in changing young novice driver risky behaviour. Driver education and training focusing on vehicle handling skills has been found to be counterproductive as it appears to make the young novice driver more accepting of driving risks (Hedlund, 2007). In-car technologies such as speed governors appear promising (OECD, 2003); however, the cost of such interventions may be prohibitive for families of young drivers. There is increasing evidence confirming the effectiveness of GDL which acts as a form of exposure control by allowing novices to gain more driving experience under more supervision over an extended period in lower-risk circumstances. These programs vary widely by jurisdiction; however extended durations with greater restrictions such as passenger limits and night driving curfews have been shown to result in the greatest improvements in young novice driver road safety (Williams, Chaudhary, Tefft, & Tison, 2010). High reports of non-compliance by young novice drivers (e.g., in New Zealand, Harre et al., 1996) and haphazard enforcement (Rice et al., 2004), the issuing of warnings instead of punishment for infringement of road rules (Rhodes et al., 2005), and failure to detect noncompliance (Scott-Parker et al., in press) weaken such interventions.

Road safety researchers have begun to consider the nature and the breadth of the psychosocial influences, including the individual's personality traits, upon the risky behaviour of the young novice driver in an attempt to better understand how to reduce their involvement in road crashes. Risky driving behaviour has been found to be associated with the individual's propensity for sensation seeking (Scott-Parker et al., 2009a) and their psychological distress as indicated by anxiety and depression (Scott-Parker et al., 2011a). Rewards associated with driving including the experience of pleasurable sensations such as excitement (Scott-Parker et al., 2009a) and status among peers (Scott-Parker et al., 2009a, b; Scott-Parker et al., 2012a), also appear to influence the driving behaviour of the young novice. To the authors' knowledge, research exploring the young driver's personal propensity for sensation seeking within the context of the influence of other psychological traits and states such as sensitivity to punishment, sensitivity to reward and their self-reported psychological distress has not been examined previously, and this examination may reveal avenues of intervention for young driver risky behaviour countermeasures.

7.3.3 Sensitivity to punishments and rewards and the young novice driver

The reinforcement sensitivity theory (RST) of personality proposed by Gray (1970, 1982, cited in Corr, 2008) explicates both cognitive and psychological processes within personality, particularly emotion and motives for behaviour in the presence of pleasant and aversive stimuli (Corr, 2008). Three systems were proposed by Gray (1982, cited in Torrubia et al., 2001) as helping to regulate the behaviour of the individual in particular circumstances: the behavioural reactivity and responsivity of the individual's behavioural activation system (BAS), behavioural inhibition system (BIS), and fight flight system. These regulatory systems were hypothesised to influence an individual's sensitivity to reinforcing events and control their emotional experiences (Corr, 2008). The original RST proposed that the two primary feedback systems which regulate the individual's behaviour were the BAS which was thought to be sensitive to rewards, 'activating' behaviour in rewarding circumstances, and the BIS which was thought to be sensitive to punishments, 'inhibiting' behaviour in aversive circumstances. Gray postulated that the BIS contributed to anxiety, whilst the BAS contributed to impulsivity (see Smillie, Pickering, & Jackson, 2006 for a review).

A number of tools have been developed in recent years to measure the operation of the BIS and the BAS, mostly via self-report (see Torrubia et al., 2001 for a review). The Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) was a self-report questionnaire with two subscales that were designed to explore the operation of the BIS as sensitivity to punishment (SPQ) and the BAS via sensitivity to reward (SRQ). It is a refinement of earlier scales including the Susceptibility to Punishment Scale (Torrubia & Tobena, 1984, cited in Torrubia et al., 2001) and Susceptibility to Reward Scale (Muntaner & Torrubia, 1985, cited in Torrubia et al., 2001). SP and SR scores of the new SPSRQ have been found to be associated as expected with other instruments that measure BIS- and BAS-related personality traits such as neuroticism, impulsive sensation seeking (Zuckerman & Kuhlman, 2000), and anxiety (Torrubia et al., 2001). Interestingly, Torrubia et al. (2001) reported no gender differences in SP, with males reporting greater SR than females.

The SPSRQ has been used to explain risky behaviours such as dysfunctional eating and hazardous drinking (Loxton & Dawe, 2006). Individuals with greater SR and less SP have also been found to be more likely to use marijuana (Simons &

Arens, 2007) and methamphetamines (Simons, Dvorak, & Batien, 2008). Marijuana use and expectancies regarding use were also found to be moderated by the individual's SP and SR (Simons & Arens, 2007). The current research will examine the role of SP and SR in self-reported risky driving behaviour, including the potential differential influences for each gender, in addition to exploring the relationships between SP and SR and sensation seeking propensity, anxiety and depression.

7.3.4 Propensity for sensation seeking and the young novice driver

Importantly, as noted earlier, risky driving behaviour has a range of potential rewards associated with it which can impact upon road safety (Cavallo et al., 1997). Of particular concern for the young novice driver is experiencing strong desirable emotions (see Jonah, 1997, for a review). These feelings include excitement and power (Arnet et al., 1997; Sullman, 2006) and they have consistently been found to be associated with risky driving, offences and crashes (Rimmo & Aberg, 1999). The Impulsive Sensation Seeking scale (Zuckerman, 1994) has been used in adolescent populations to explore this experience of excitement that is presumed to be demonstrative of a personal propensity for sensation seeking (PPSS) (e.g., in Spain, Goma-i-Freixanet et al., 2004). The Scale has been found to be predictive of risky behaviour (e.g., Zuckerman & Kuhlman, 2000) including risky driving behaviour (Oltedal & Rundmo, 2006). Personal propensity for sensation seeking has also been found to be predictive of self-reported risky driving behaviour over other personality traits such as conscientiousness and anger; however, it is noteworthy that it did not predict risky behaviour in a virtual environment driving task (Schwebel et al., 2006).

As noted earlier, Gray aligned the individual's SR to the personality trait of impulsivity, and due to conceptual similarity measures of SR appear also to measure sensation seeking propensity (Smillie et al., 2006). Torrubia et al. (2001) reported a significant relationship between sensation seeking propensity as measured by Zuckerman's scale and the SRQ (r = .36-.43 for females; r = .41-.45 for males). In addition, there was no relationship between SPQ scores and sensation seeking propensity (e.g., r = .02-.08 for females; r = .04-.08 for males). Whilst there appears to be shared variance amongst the constructs of SR and personal propensity for sensation seeking (PPSS), the nature of this relationship has not been elucidated for the young novice driver, and in particular in relation to their self-reported risky

driving behaviour. It may be that the PPSS is incorporated within SR, or that SR is fully encapsulated within an individual's PPSS. The Zuckerman-Kuhlman Impulsivity-Sensation Seeking scale (ISSS) (Zuckerman et al., 1993) will be utilised in the current study to measure PPSS. Understanding the relationship between SR and PPSS may reveal additional avenues for intervention in road safety. Furthermore, the cognitive, physiological, behavioural and social maturation of the young novice driver can have implications for their risky behaviour (Dahl, 2008) beyond their SR, SP and PPSS.

7.3.5 Depression, anxiety and the young novice driver

Adolescents experience a high incidence of psychological distress, evidenced as anxiety and depression, and a corresponding association with risky behaviour has been found. American research reports the prevalence of depression during adolescence at 24% (Avenevoli et al., 2008), and 1 in 10 adolescents are likely to be depressed at any given time (Strine et al., 2008). Research also reveals that adolescents who experience depression are more likely to become adults who experience depression (Mulye et al., 2009). There are differences in the experience of psychological distress for each gender and over the developmental period of adolescence, irrespective of ethnicity (Huang et al., 2009), with greater prevalence of depression in females (Boticello, 2009) who tend to experience symptoms earlier (Crawford, Cohen, Midlarsky, & Brook, 2001).

Kessler's Psychological Distress Scale (K10), developed by Kessler and Mroczek (1994, cited in Andrews & Slade, 2001), is a 10-item measure of non-specific psychological distress – that is, for mood or anxiety disorder. The individual indicates on a scale of 1 (*none of the time*) to 5 (*all of the time*) how often they felt a particular way within the previous four weeks, such as tired, sad or depressed, and worthless. The scale is short, easily administered, and scores are calculated by summing each response on the 5-point Likert scale. Low scores indicate low psychological distress and higher psychological adjustment, thus: 10 = no psychological distress; 11-15 = low distress; 16-21 = moderate distress; 22-29 = high distress; 30-50 = very high psychological distress. However, various combinations of thresholds have been utilised in research. For example Huang et al. (2009) defined the following ranges: 22-30 = moderate psychological distress, > 30 = severe psychological distress, adjusted in response to the normative experience of

psychological distress by adolescents, suggesting that it is acceptable to define K10 scores in relation to the specific population being researched.

The K10 is more clinically accurate in screening for psychological distress than other popular instruments such as the General Health Questionnaire (Furukawa et al., 2003) and the Composite International Diagnostic Interview Short-Form (CIDI-SF) scale (Kessler et al., 2003). The K10 items align well with Criterion A of the DSM-IV (TR) diagnoses of major depressive episode (Cairney et al., 2007) – higher scores corresponding to greater probability the respondent meets the criteria for a current DSM-IV (TR) or CIDI mental disorder diagnosis (Andrews & Slade, 2001).

Factor analytic studies of the scale have identified the two factors of depression (DEP) and anxiety (ANX) within the K10 (Brooks et al., 2006). DEP and psychological distress have been found to be associated not only with risky behaviours such as unprotected sex (Swanholm et al., 2009), cigarette smoking and unsafe levels of alcohol consumption (Waller et al., 2006), but also with physical inactivity and obesity (Strine et al., 2008), and eating disorders (Darby et al., 2007). Slessareva and Muraven (2004) found that psychological distress, that is DEP and ANX, mediated the relationship between the personality trait of self-control and SP. Torrubia et al. (2001) reported that SP and ANX were highly associated for both males (r = .68) and females (r = .59), whilst SR and DEP were not related for either males (r = .03) or females (r = .10).

DEP and ANX have also been found to be predictive of risky driving behaviour in young and older drivers alike. DEP was the only psychosocial characteristic that predicted future drink driving amongst Swedish drink-driving offenders (Hubicka et al., 2010). ANX has been sound to be significantly associated with both risky driving and sensation seeking propensity of young novice drivers (Oltedal & Rundmo, 2006), and young novice drivers with high self-reported ANX were more likely to engage in risky driving behaviour (Ferreira et al., 2009). In contrast, for more experienced drivers, simulator driving tasks have revealed that drivers with higher ANX are more likely to drive more cautiously (Stephens & Groeger, 2009). The full K10 used as the measure of psychological distress has also been found to predict self-reported risky driving behaviour (Scott-Parker et al., 2011a).

Studies to date have not distinguished between the influence of the two subscales of DEP and ANX within the K10. Whilst prior research, and their inclusion within one psychological instrument, suggests that they are highly correlated, the precise relationship between the constructs – and the role each plays in risky behaviour – requires further examination. Research using other instruments such as the Depression, Anxiety and Stress Scale–Short Form has found that DEP and ANX were highly correlated (r = .64). (Wu & Wei, 2008). The current research is designed to explore the relationships between SR and SP, PPSS, and ANX and DEP as separate-yet-related constructs and the self-reported risky driving behaviour of the young novice. On the basis of the research outlined above, it seems likely that there will be a relationship between SP and ANX and DEP, and a relationship with ANX and DEP, PPSS and SR.

7.3.6 Study aims

It has been seen that the risky driving behaviour of the young novice is likely to differ according to their psychological distress as measured by their depression and anxiety, their sensitivity to punishments and rewards, and their personal propensity for sensation seeking. In addition, the individual's gender has also been seen to be influential (e.g., Li et al., 2007), and given the nature of the developmental period of adolescence, it is likely that the age of the novice driver may also be of consequence. The relationships amongst these variables however have not been elucidated in prior research. The research reported in this paper is part of a larger study undertaken in Queensland, Australia that used an online survey designed to explore the psychosocial characteristics of, and influences upon, the risky behaviour of young novice drivers in Queensland. The current study aims to explore the direct and indirect relationships between the variables of SR, SP, PPSS, DEP, and ANX, whilst considering the influence of the novice's gender and age.

7.4 Method

7.4.1 Participants

Seven hundred and sixty-one drivers (523 women and 238 men) aged 17-25 years (M = 19.00, SD = 1.59) with a Provisional (intermediate) driver's licence volunteered to complete the 25-minute online survey. The sample size exceeds the 20 participants to each variable ratio recommended by Kline (2011).

7.4.2 Measures

Participants reported their age and gender and completed the binary 48-item SPSRQ (Torrubia et al., 2001) (*yes*, *no*) and the 19-item ISSS from the Zuckerman-Kuhlman Personality Questionnaire (Zuckerman et al., 1993) (*true, false*). Participants also responded to the 5-point Likert scales of the K10 (Kessler et al., 2003) (1 = *none of the time,* 5 = *all of the time*) which was subsequently divided into DEP and ANX subscales, and the 44-item Behaviour of Young Novice Drivers Scale (the BYNDS; Scott-Parker et al., 2010) (1 = *never,* 5 = *almost always*). All items in all scales were summed and analyses were undertaken using the composite scores for each of the instruments. Higher scores on the SPSRQ, the ISSS, and the K10 indicate greater sensitivity to punishment and reward, propensity for sensation seeking and psychological distress; higher scores in the BYNDS indicate more self-reported risky driving.

7.4.3 Procedure and design

A cross-sectional survey design was used for the online survey. The hyperlink to the survey was forwarded to the 13 major tertiary education institutions (technical colleges and universities) in the state of Queensland, Australia, and was available online from mid-August to 30 October, 2009. Students aged 17-25 years with a provisional driving licence were eligible to participate. Incentives for participation included the opportunity to win one of four $350 fuel vouchers or research participation credit for eligible university students. Participants reported their age and gender, completed the binary (*yes*, *no*) 48-item SPSRQ, the binary (*true, false*) ISSS, the K10 with a range of 1(*none of the time*) to 5 (*all of the time*) which was subsequently divided into DEP and ANX subscales, and the 44 item Behaviour of Young Novice Drivers Scale (the BYNDS; Scott-Parker et al., 2010), with a range of 1 (*never*) to 5 (*almost always*). All items in all scales were summed and analyses were undertaken using the composite scores for each of the established instruments.

7.4.4 Statistical analyses

Measures of internal consistency utilised Cronbach's alpha (α). Prior to path analysis, bivariate correlations were used to explore the strength of association between the study variables. Bivariate correlations between continuous variables

utilised Pearson's product moment correlation *(r)*. Bivariate correlations between continuous and dichotomous variables utilised point biserial correlations *(r_{pb})*. Factor analysis was also be used to explore the relationship between the variables. The online survey tool was created in KeySurvey Enterprise Online Survey Software. All analyses were conducted using AMOS version 18 and the Statistical Package for the Social Sciences (SPSS) version 18.0.

7.5 Results

7.5.1 Descriptive analyses

There was no missing data in the online survey, and all data was exported to SPSS for analysis. Table 7.1 reports the means, standard deviation and α for each of the variables in the study. The young novice drivers reported moderate levels of risky driving (BYNDS range = 44-166), propensity for sensation seeking (ISSS range 19-38), sensitivity to punishment (SP range 0-24), sensitivity to reward (SR range 0-24), and psychological distress as indicated by depression (DEP range 6-30), and anxiety (ANX range 4-20). Given the gender differences apparent in the literature review, the means and standard deviations were also calculated separately for each gender. As can also be seen in Table 7.1, males reported greater SR than females, whilst females reported more DEP than males.

Table 7.1 Means and standard deviations for all scales for all the young novice drivers (*N* = 761), and separately for the male (*N* = 238) and female (*N* = 523) participants

Scale	Cron-bach's Alpha	Skew	Kurt-osis	Young Novice Drivers					
				N = 761		Male *N* = 238		Female *N* = 523	
				M	*SD*	*M*	*SD*	*M*	*SD*
SPQ	0.82	0.01	-0.80	12.16	5.17	11.46	5.41	12.48	5.04
SRQ	0.75	0.22	-0.20	11.32	4.48	12.53	5.41	10.77	4.37
ISSS	0.82	0.13	-0.86	28.20	4.36	29.02	4.45	27.81	4.27
ANX	0.79	1.12	1.57	7.63	2.69	7.29	2.55	7.79	2.75
DEP	0.90	1.17	1.23	11.84	4.86	10.91	4.47	12.27	4.98
BYNDS	0.94	0.85	0.99	84.67	20.44	85.26	21.50	84.44	19.96

SPQ = Sensitivity to Punishment Questionnaire; SRQ = Sensitivity to Reward Questionnaire; ISSS = Impulsive Sensation Seeking Scale; DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; BYNDS = Behaviour of Young Novice Drivers Scale.

Table 7.2 contains the correlations between the scales, gender, and age of the young novice drivers. SR was strongly associated with PPSS (greater SRQ associated with greater PPSS), and both SR and PPSS were strongly associated with more self-reported risky driving behaviour. DEP and ANX were strongly associated (greater DEP associated with greater ANX), and DEP and ANX were strongly associated with greater SP and with more self-reported risky driving behaviour.

Table 7.2 Correlations between sensitivity to punishment and reward, sociodemographic variables, driving behaviours, and propensity for sensation seeking

Key Measure	Gender	Age	SPQ	SRQ	ISSS	ANX	DEP
Age	-.01	_					
SPQ	.09**	.06	_				
SRQ	-.18***	-.03	.08*	_			
ISSS	-.13***	-.02	-.11**	.52***	_		
ANX	.09**	.04	.39***	.16***	.11**	_	
DEP	.13***	.02	.43***	.15***	.11**	.70***	_
BYNDS	-.02	-.06	.03	.41***	.40***	.26***	.27***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Bivariate correlations between continuous variables utilised Pearson's product moment correlation *(r)*. Bivariate correlations between continuous and dichotomous variables utilised point biserial correlations *(r_{pb})*. SPQ = Sensitivity to Punishment Questionnaire; SRQ = Sensitivity to Reward Questionnaire; ISSS = Impulsive Sensation Seeking Scale; DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; BYNDS = Behaviour of Young Novice Drivers Scale.

Again given the gender differences highlighted in the literature review, additional correlation analyses were undertaken for gender, age, and the six scales. Table 7.3 summarises these correlations. As can be seen, compared to males, for female young novice drivers greater PPSS was associated with less SP and with more DEP. In addition, whilst significant for both males and females, the positive relationship between SR and risky driving behaviour (measured by the BYNDS) is stronger for females than males.

7.5.2 Path analyses

To explore the extent that gender, age, SP and SR, PPSS, DEP and ANX predict self-reported risky driving behaviour, a path diagram was created. Given the univariate normality of the variables as depicted in Table 7.1, and the multivariate

Table 7.3 Correlations between sensitivity to punishment and reward, sociodemographic variables, driving behaviours, and propensity for sensation seeking for male[1] and female[2] young novice drivers

Key Measure	Age	SPQ	SRQ	ISSS	ANX	DEP	BYNDS
Age	1.00	.02[1]	-.08	-.01	-.01	.02	.04
SPQ	.08[2]	1.00	.12	-.02	.41***	.48***	.03
SRQ	-.01	.09*	1.00	.55***	.18**	.14*	.34***
ISSS	-.03	-.14**	.49***	1.00	.11	.04	.38***
ANX	.06	.38***	.18***	.13**	1.00	.66***	.22**
DEP	.02	.40***	.19***	.17***	.71***	1.00	.26***
BYNDS	-.10*	.03	.45***	.42***	.28***	.29***	1.00

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. [1] The bivariate correlations for male young novice drivers are reported above the diagonal. [2] The bivariate correlations for female young novice drivers are reported below the diagonal. Bivariate correlations between continuous variables utilised Pearson's product moment correlation *(r)*. Bivariate correlations between continuous and dichotomous variables utilised point biserial correlations *(r_{pb})*. SPQ = Sensitivity to Punishment Questionnaire; SRQ = Sensitivity to Reward Questionnaire; ISSS = Impulsive Sensation Seeking Scale; DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; BYNDS = Behaviour of Young Novice Drivers Scale.

normality as indicated by a skew less than 2.0 and a kurtosis less than 7.0, path analysis used maximum likelihood estimation to estimate the parameters of the model. Good model fit was determined by a combination of the likelihood ratio chi-square statistic (χ^2 non-significant or less than three times the degrees of freedom), Bentler's Comparative Fit Index (CFI $\geq$ .95), the Joreskog-Sorbom Goodness of Fit Index (GFI $\geq$ .95), the Steiger-Lind Root Mean Square Error of Approximation (RMSEA $\leq$ .08) including 90% confidence intervals (Kline, 2011), and the Tucker-Lewis Index (TLI $\geq$ .95). Path coefficients and R^2 were also examined.

The initial model was unable to be fitted to the data, χ^2 (36) = 0.00. The modification indices recommended that the path from SPQ to BYNDS be removed, as depicted in Figure 7.1. The modified model was a good fit to the data, χ^2 (35) = 5.19, p = .023, GFI = .99, CFI = .99, TLI = .91, RMSEA = .07, [.02-.14], and the model and path coefficients are provided in Figure 7.1. Paths significant at $p < .05$ revealed that self-reported risky driving behaviour was predicted by the young novice driver's ANX, DEP, PPSS, and SR. SR and PPSS had the largest beta weight of the predictors (β = .25). The revised model explained 27% of the variance in self-reported risky driving behaviour.

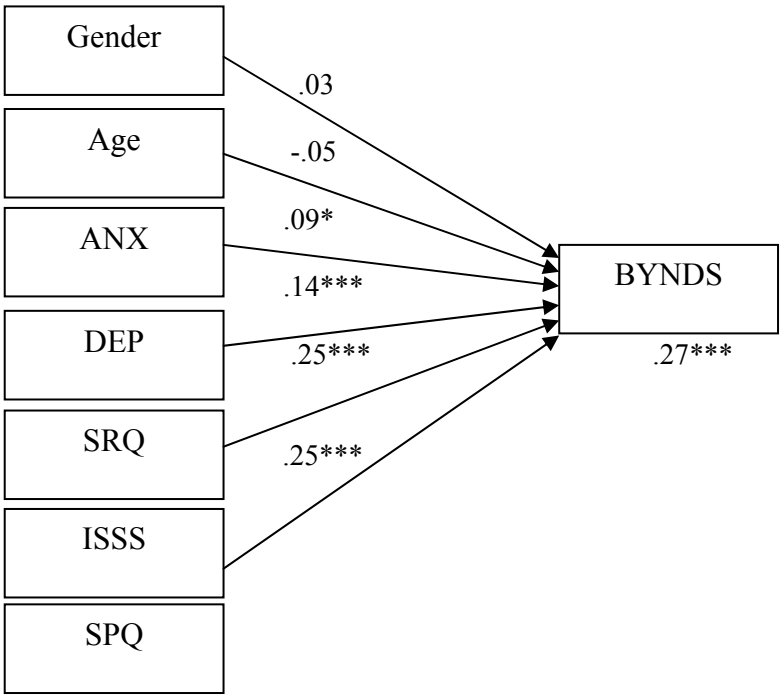


Figure 7.1 Revised path model for gender, age, sensitivity to punishment and reward, anxiety and depression, personal propensity for sensation seeking and self-reported risky driving behaviour

Note: * $p < .05$, *** $p < .001$. (Goodness of fit: χ^2 (1, N = 761) = 5.20, p = .02, GFI = .99, CFI = .99, TLI = .91, RMSEA = .07 [.02- .14]). For ease of interpretation, the covariance arrows with associated correlations are not depicted on the Figure. The reader is referred to Table 7.2 for the correlations between the variables. SPQ = Sensitivity to Punishment Questionnaire; SRQ = Sensitivity to Reward Questionnaire; ISSS = Impulsive Sensation Seeking Scale; DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; BYNDS = Behaviour of Young Novice Drivers Scale.

7.5.3 Mediation analyses

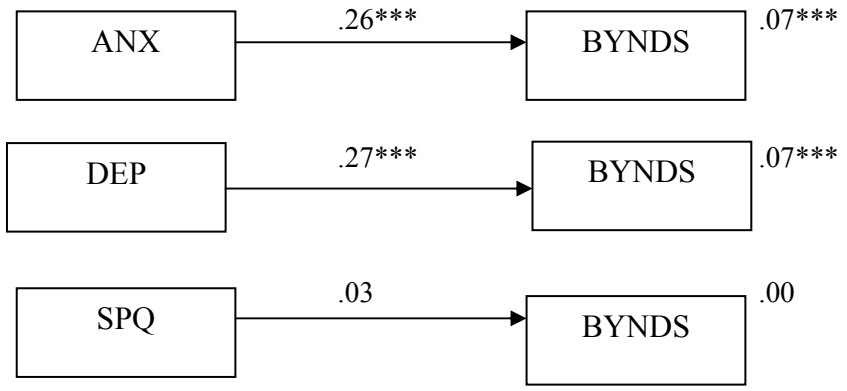
After consideration of the relationships between the variables and their prediction of self-reported risky driving behaviour, the variable of participant *age* was removed from further analyses. Participant *gender* was also removed at this stage. The literature suggests that there is a complicated relationship between SP, ANX, DEP and risky behaviour, and there is an association between risky driving behaviour and ANX, DEP and SP as indicated by the correlation coefficients in the preliminary correlation analyses (and again by the path analysis, not shown). There also appears to be an association between PPSS and SR as discussed in the literature review, and a relationship between risky driving behaviour, PPSS and SR as indicated by the significant correlation coefficients in the preliminary correlation analyses (and again by the path analysis, not shown). An exploratory factor analysis based upon a principal components extraction of factors was followed by an oblique

rotation to confirm the correlation relationships amongst the variables. Two factors were confirmed accounting for 59.13% of the variance. Factor 1 contained ISSS and SRQ and accounted for 26.02% of the variance, whilst Factor 2 contained SPQ, ANX, and DEP and accounted for 33.11% of the variance.

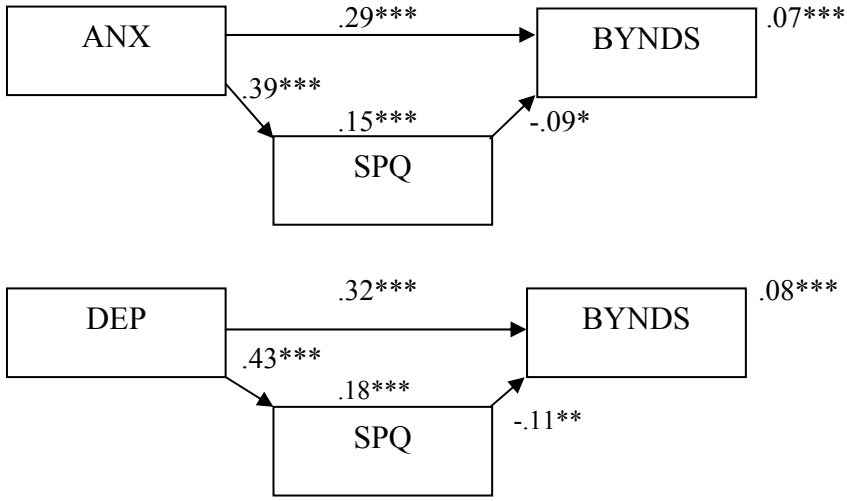
Accordingly a mediation relationship between ANX and DEP and the individual's SP was explored. Figure 7.2 illustrates the six models and the path coefficients obtained from each analysis. As can be seen from Figure 7.2A, the young novice drivers' ANX and DEP individually significantly influence their risky driving behaviour. It is noteworthy that whilst SP did not emerge as a significant predictor of self-reported risky driving behaviour, this does not exclude it from being a mediator (Mallinckrodt, Abraham, Wei & Russell, 2006). Three further models were tested. Figure 7.2B depicts the mediation of ANX and DEP each by sensitivity to punishment. Whilst ANX and DEP were each mediated by SP, the overall explanation of risky driving behaviour by the three variables did not change significantly, suggesting that the mediation relationship is not influential in this instance. Figure 7.2C depicts the mediation of both ANX and DEP by SP, and again the overall explanation of risky driving behaviour by the three variables did not change significantly, similarly suggesting that the mediation relationship is not influential in this instance.

The mediation relationship between PPSS and SR was also investigated. To explore the possible mediation, four models were tested. Figure 7.3 summarises the four models and the path coefficients obtained from each analysis. Figure 7.3A demonstrates that, as indicated by the revised path model in Figure 7.1, both SR and PPSS significantly explain the self-reported risky driving behaviour of the young novice. However, it appears that whilst correlated (see Table 7.1), SR and PPSS also have some shared variance rather than a mediational relationship (Figure 7.3B). The revised path model was amended again to reflect the co-varying relationships found in the mediational analyses (specifically, between ANX and DEP, and between SR and PPSS) and the coefficients and model are depicted in Figure 7.4. The model was a good fit to the data, χ^2 (4) = 22.87, $p < .001$, GFI = .99, CFI = .98, TLI = .95, RMSEA = .07, [.05-.11]. PPSS, SR, and DEP were significant predictors of the self-reported risky driving behaviour of the young novice, explaining a significant 24% of the variance in risky behaviour. It is noteworthy too that the influence of ANX was approaching significance ($p = .05$).

7.2A



7.2B



7.2C

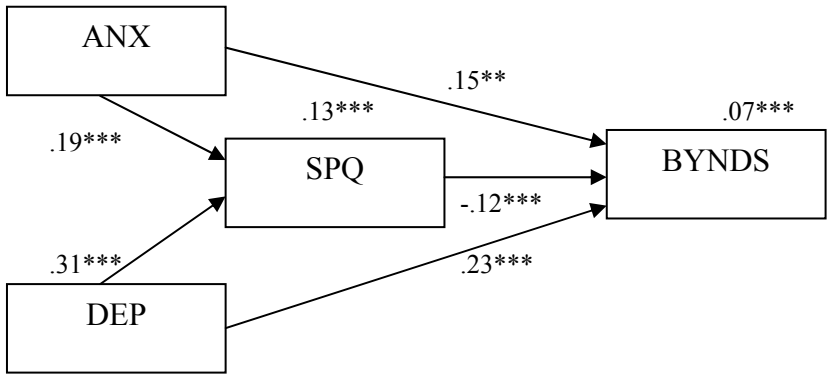


Figure 7.2 Path models exploring the mediation relationship between sensitivity to punishment, anxiety, depression and self-reported risky driving behaviour

Note: ** $p < .05$, ** $p < .01$, *** $p < .001$.* SPQ = Sensitivity to Punishment Questionnaire; DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; BYNDS = Behaviour of Young Novice Drivers Scale

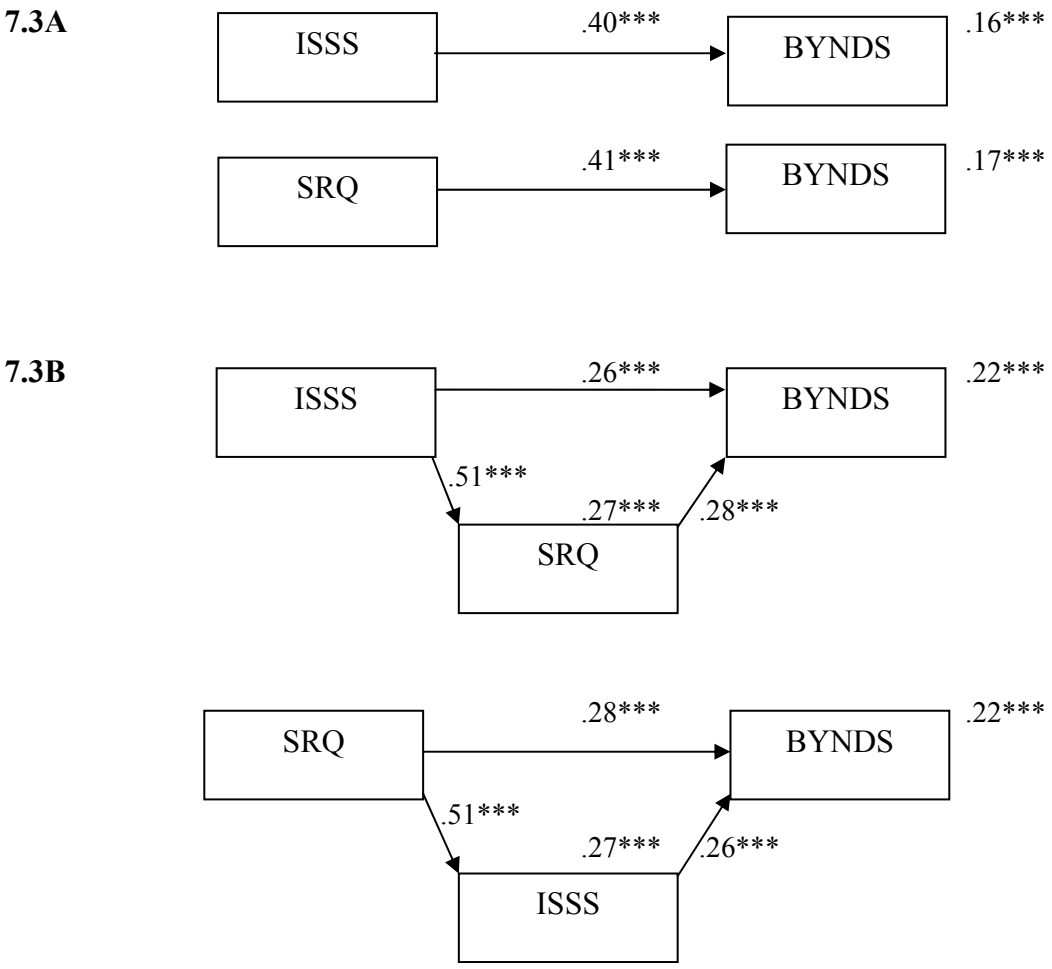


Figure 7.3 Path models exploring the mediation relationship between sensitivity to reward, personal propensity for sensation seeking and self-reported risky driving behaviour

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. SRQ = Sensitivity to Reward Questionnaire; ISSS = Impulsive Sensation Seeking Scale; BYNDS = Behaviour of Young Novice Drivers Scale.

7.5.4 Moderation analyses

The literature review and the investigation of the association between gender and the study variables as a composite and separately for male and female participants (Table 7.1) suggests that moderation analyses, based on the *gender* of the young novice driver, is also warranted. Given that there are two discrete genders, the simplest approach is to assess the model fit of the revised model separately for male and female young novice drivers, and the separate gender analyses revealed interesting differences in the contribution of the model variables to the self-reported risky behaviour of the young novice driver (Figure 7.5). The revised path model for males (Figure 7.5A) had a good fit to the data, χ^2 (4) = 8.79, p = .07, GFI = .99, CFI = .98, TLI = .96, RMSEA = .07, [.00-.14]. The revised model explained 21% of the

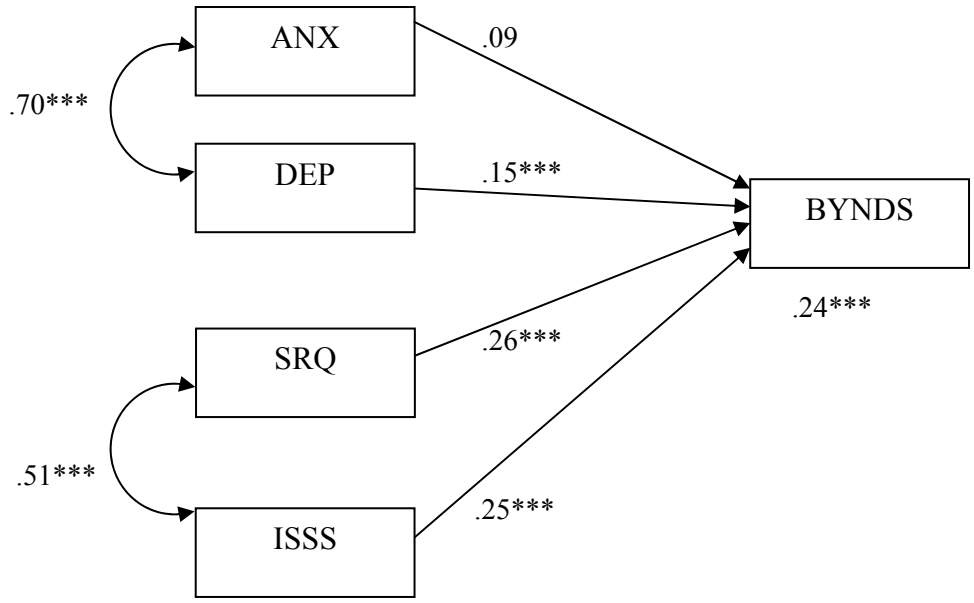


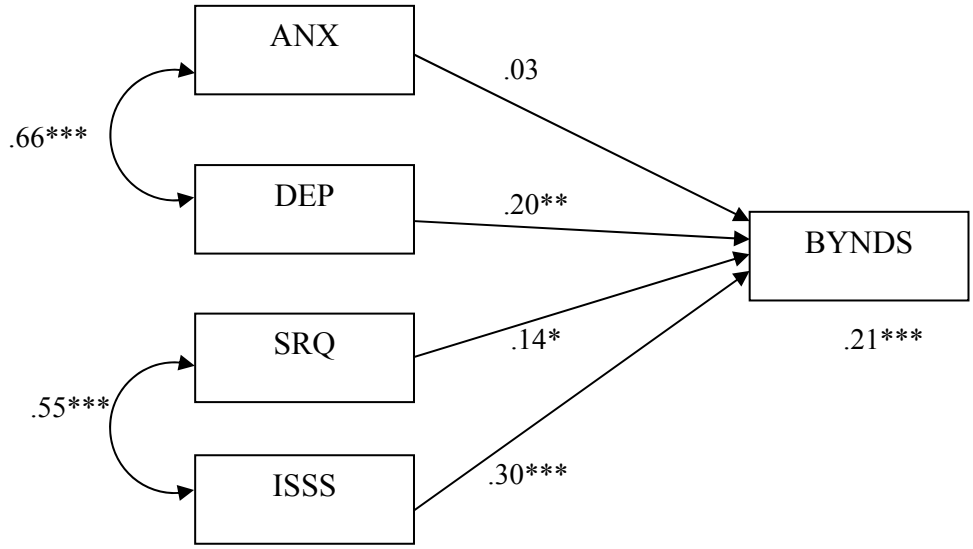
Figure 7.4 Final path model predicting the self-reported risky driving behaviour of young novice drivers according to their personal propensity for sensation seeking, sensitivity to reward, depression and anxiety

Note: *** $p < .001$. (Goodness of fit: χ^2 (4, N = 761) = 22.87, p < .001, GFI = .99, CFI = .98, TLI = .95, RMSEA = .08 [.05- .11]). DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; SRQ = Sensitivity to Reward Questionnaire; ISSS = Impulsive Sensation Seeking Scale; BYNDS = Behaviour of Young Novice Drivers Scale

variance in the self-reported risky driving behaviour of the young male novice driver. The significant predictors were DEP, PPSS, and SR. Figure 7.5B demonstrates the revised model for the female young novice drivers, which also had an acceptable fit to the data, χ^2 (4) = 25.32, p < .001, GFI = .98, CFI = .97, TLI = .93, RMSEA = .10, [.07-.14]. The revised model explained 27% of the variance in the self-reported risky driving behaviour of the young female novice driver. The significant predictors were ANX, DEP, PPSS, and SR.

Examining the significance of the predictors and the β-weights, the risky driving behaviour of male and female novices alike were considerably impacted upon by their PPSS. Female novice risky driving behaviour is also greatly influenced by their SR, with DEP and ANX also influential. The risky behaviour of young males, in comparison, is more impacted upon by their DEP, and less influenced by their SR than females and not influenced by their ANX.

7.5A Males



7.5B Females

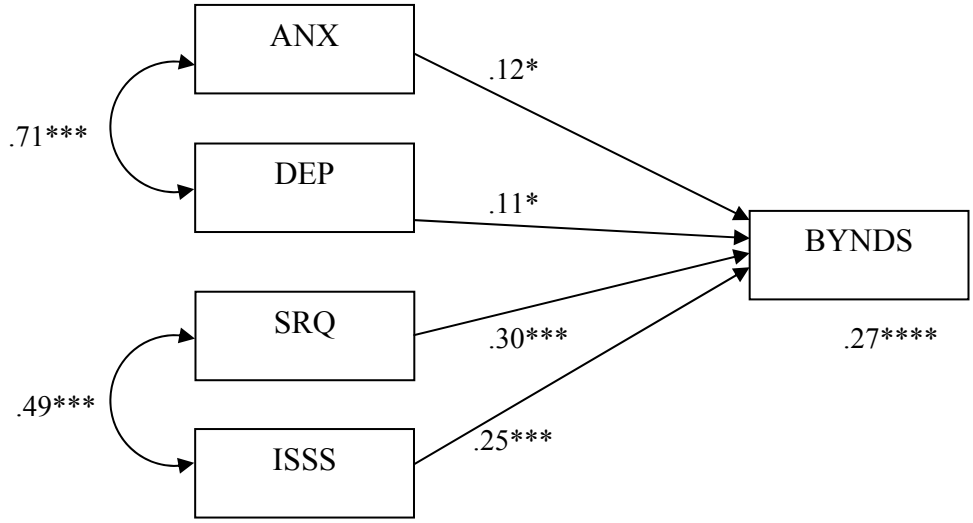


Figure 7.5 Final path models illustrating the moderation by gender of self-reported risky driving behaviour of young novice drivers

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; SRQ = Sensitivity to Reward Questionnaire; ISSS = Impulsive Sensation Seeking Scale; BYNDS = Behaviour of Young Novice Drivers Scale

7.6 Discussion

SR was strongly associated with PPSS, and each trait was strongly associated with the self-reported risky driving behaviour of the young novice drivers. ANX and DEP were strongly associated with SP and with self-reported risky driving behaviour. The final path model demonstrated that DEP, SR and PPSS predicted

24% of variance in self-reported risky driving behaviour. Gender was found to be a moderating variable. Males reported greater SR and PPSS than females, and the path model for males indicated the PPSS was the strongest predictor of the two, followed by DEP then SRQ, the model explaining 21% of the variance in self-reported risky driving behaviour. Females and males reported similar ANX and SPQ, however females reported greater DEP, and the path model for females which explained 27% of variance in risky driving indicated that SRQ was the strongest predictor of self-reported risky driving, followed by PPSS. Both ANX and DEP were significant predictors for females.

The results have implications for mental health practitioners and road safety researchers alike. Psychological distress has been found to be a significant predictor of self-reported risky driving behaviour by young novice drivers (Scott-Parker et al., 2011a), and the research has elucidated the separate influence(s) of DEP and ANX on male and female young novice drivers' behaviour. Young novice drivers who are experiencing anxiety are at increased risk of injury from a car crash as their greater self-reported risky driving behaviour places them at more risk of a road crash. In addition, depression also places the young female novice driver at greater risk. Interventions designed to ameliorate depression and anxiety is likely to have broader benefits, such as increased road safety for young and older road users alike.

SR and PPSS (measured by the ISSS), whilst clearly strongly related, are not subsumed within each other, and each exerts their own influence upon the risky behaviour of male and female young novice drivers alike. A greater proportion of the influence of the young male driver's SR seems to be captured within their PPSS. This is in contrast to the young female driver for whom SR remains a substantial source of influence separate from the PPSS. The findings suggest that for males the kinds of rewards that impact upon their risky driving are primarily those which generate feelings of power and control, or excitement. On the contrary, for females there appear to be other rewards in addition to such sensations which impacts upon their risky driving. These may include pragmatic rewards such as shorter journey times when in a hurry, however further exploration is required.

Interventions designed to counter risky behaviour by young novice drivers – such as the GDL legislation introduced in Queensland in July 2007 – frequently rely upon the threat and administration of punitive measures to curtail such behaviour. However this study shows that while the young novice driver sample was sensitive

to punishment, this did *not* explain their risky driving behaviour. Therefore an intervention that takes into account young drivers' personal propensity for sensation seeking and sensitivity to *rewards* is likely to be more effective in reducing risky behaviour. In addition, countermeasures could consider gender differences in the influence of the psychosocial influences of DEP, ANX, SR and PPSS. Such considerations are likely to lead to a reduction in the number of crashes, and the injuries and fatalities arising from crashes involving young novice drivers.

This was the first study to explore the link between ANX, DEP, SP, SR and ISS in relation to the self-reported risky behaviour of young novice drivers. Path models for each gender indicate that the nature of the influence of these psychosocial constructs shows this relationship is not straightforward. This finding suggests that research into the various influences upon young novice driver behaviour should incorporate separate analyses by gender, and interventions similarly may need to consider the gender of the young novice driver. This study was the second application of the SPSRQ to an Australian young driver population. The previous application relied upon psychology undergraduates who may not have been young novice drivers, and did not explore gender differences (Cooper & Gomez, 2008). The SPSRQ has also featured in online surveys (e.g., Simons & Arens, 2007; Simons et al., 2008). In addition, the study divided the nature of psychological distress as measured by the K10 according to the separate subscales of anxiety and depression. This allowed a further delineation of the influence of these mental health variables that have been found to be predictive of risky driving behaviour, thereby facilitating an examination of the influence of these related yet distinct constructs and the relationships between each.

The generalisability of the study findings is limited by the survey procedure and method and the number and type of participants sampled. The survey tool was an online survey that was made available to all enrolled students at the 13 major Queensland tertiary education institutions, and therefore the sample may not be representative of all Queensland young novice drivers. In addition, the response rate for the study could not be calculated as there was no way to determine how many young novice drivers accessed the survey and chose not to participate. More female than male young novice drivers completed the survey (68.7% female), reflecting a greater participation of female young drivers even when the higher female student population is taken into account (55% of the populations of the two Universities the

majority of the participants reported being students at in 2009 were female). Separate analyses by gender were undertaken however. Whilst some variables were highly correlated, for example SR and PPSS, there was no evidence of multicollinearity, and a large sample was obtained for both male and female novices.

Future research should be undertaken exploring self-reported risky driving behaviour, actual driving behaviour as observed in driving simulators or in-car video-recording devices, police-reported crashes, and police-detected offences, utilising the SPSRQ, ISSS and K10 in different populations in Australia and around the world. Longitudinal studies would allow an exploration of the stability not only of these states and traits but also the extent of the influence of these states and traits upon the behaviour of the young novice driver as they mature from an adolescent to an adult and from a novice to an experienced driver. Such research could be used to inform countermeasure development.

Young novice driver road safety research has begun to consider the variety and extent of the psychosocial influences upon the risky behaviour of young drivers. This risky behaviour contributes to their overrepresentation in car crashes and their subsequent injuries and fatalities. In addition, the relationship between SP and SR and the individual's PPSS had not been investigated within the domain of the risky driving behaviour of the young novice nor in relation to their ANX and DEP, both of which have been found to be associated with risky driving behaviour.

As shown in the current study, the young driver's SR explained significant variance in their risky behaviour in addition to their PPSS, indicating that whilst these constructs are related they reflect distinct influences upon the young driver's risky behaviour. Notably, the extent of this influence differed for male and female young drivers. Moreover, whilst ANX was influential upon the risky behaviour of males and females alike, DEP was also influential for the female novice driver specifically. Continued reliance upon punishment to curtail risky behaviour is not supported by the study findings, because although young drivers are indeed sensitive to punishment, this does not explain their risky behaviour. Rather, countermeasures reducing the rewards and sensation seeking experienced by the young novice driver are warranted. Interventions that address any psychological distress experienced by the young novice driver merit further consideration. In addition, attention to the gender differences in the influence of these psychosocial constructs is likely to result in more effective countermeasures and interventions.

7.4 Chapter summary

Chapter Seven has contributed significantly to improving our understanding of person-related influences in the self-reported risky driving of young novices progressing through an enhanced GDL program in Queensland. Interestingly, the research found that the influence of some psychological traits (specifically, punishment sensitivity) seem to be 'captured' within psychological states (specifically, depression and anxiety). The research findings were used to inform the development of the survey instrument used within the remainder of the research program (Stages Two and Three, Appendices C and D) and highlighted the importance of person-related influences in the risky behaviour of young novice drivers. The next paper, Chapter Eight, is the remaining research undertaken within Stage One. A thematic content analysis of small group interviews of young novice drivers is reported. These findings were also used to inform the development of the survey instrument used within the remainder of the research program.

Chapter Eight: "They're lunatics on the road": Exploring the Normative Influences of Parents, Friends, and Police on Young Novices' Risky Driving Decisions

8.1 Notes

Taken from:

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). "They're lunatics on the road": Exploring the normative influences of parents, friends, and police on young novices' risky driving decisions. *Safety Science, 50*(9), 1917-1928. doi: 10.1016/j.ssci.2012.05.014

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, arguments and hypotheses, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate conducted the small group and individual interviews and the analysis of the data collected. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

The journal in which this paper was published is a peer-reviewed journal with international readership. The journal is listed in the Social Sciences Citation Index and recognised for HERDC. The 2010 Impact Factor for this journal is 1.637 and the five-year Impact Factor is 1.724. The publisher of this article (Elsevier) states in their Authors' Rights and Responsibilities that the author retains the right to use the journal article in a thesis.

This paper, Chapter Eight, uses a qualitative research methodology to gain unique insight into the nature of the *environment* influences of parents, peers and the Police on the risky driving behaviour of young novice drivers. Learner and Provisional drivers were interviewed singly and in small groups. The findings of the thematic content anlaysis, framed by Akers' SLT, further informed the development of the survey instrument used in the remainder of the research program.

8.2 Abstract

Young novice drivers experience significantly greater risk of being injured or killed in car crashes than older more experienced drivers. This research utilised a qualitative approach guided by the framework of Akers' social learning theory. It explored young novice drivers' perspectives on risky driving including rewards and punishments expected from and administered by parents, friends, and police, imitation of parents' and friends' driving, and advantages and disadvantages of risky driving.

Methods: Twenty-one young drivers (12 females, 9 males) aged 16 to 25 years (M = 17.71 years, SD = 2.15) with a Learner (n = 11) or Provisional (n = 10) driver licence participated in individual or small group interviews.

Findings and Conclusions: Content analysis supported four themes: (1) rewards and (2) punishments for risky driving, and the influence of (3) parents and (4) friends. The young novice drivers differed in their vulnerability to the negative influences of friends and parents, with some novices advising they were able to resist risky normative influences whilst others felt they could not. The authority of the police as enforcers of road rules was either accepted and respected or seen as being used to persecute young novices. These findings suggest that road safety interventions should consider the normative influence of parents and friends on the risky and safe behaviour of young novices. Police were also seen as influential upon behaviour. Future research should explore the complicated relationship between parents, friends, the police, young novices, and their risky driving behaviour.

8.3 Introduction

8.3.1 The young novice driver

Around the world, young novice drivers continue to be injured and killed in car crashes at rates that far exceed those of older, more experienced drivers. The novice faces the greatest risk when they first are able to drive unsupervised, typically whilst on an intermediate (Provisional) driver's licence, and this risk continues until approximately 25 years of age (Keating, 2007). Persons aged 17-24 years contributed 21.8% of all fatalities in Queensland, Australia in 2009, while accounting for only 12% of the population. Novices are also more likely to be at fault in a car crash: in Queensland between July 1998 and June 2008, novice drivers with a Provisional licence were found to be responsible for nearly 8 out of 10 Police reported car crashes in which they were involved (DTMR, 2010a). The overrepresentation of young novices in crash statistics has persisted even after the implementation of numerous countermeasures, policies and practices, such as fear-based media campaigns, driver training, and graduated driver licensing (GDL) programs (The GDL program in Queensland contains three licensing stages with various conditions, restrictions and tests, see Scott-Parker, Bates, Watson, King & Hyde, 2011 for the GDL experiences of Learners in Queensland, and Scott-Parker et al., in press, for the compliance of Learners and Provisional drivers with GDL and general road rules).

8.3.2 A theoretical framework

In an attempt to ameliorate the pervasive problem of young driver risky behaviour, it is important that research into the psychosocial influences upon their risky driving be informed by relevant psychosocial theory which can subsequently be utilised to formulate countermeasures and road use policy (Trifiletti, Gielen, Sleet, & Hopkins, 2005). Akers' social learning theory (SLT) (Akers et al., 1979) is one psychosocial theory that has the potential to make a contribution to understanding young driver risky behaviour. Young drivers not only learn to drive a vehicle on a roadway, they also learn safe and risky driving attitudes and driving behaviours through exposure to and the imitation of models and the experience of punishments (such as a car crash) and rewards (such as shorter journey durations). Akers' SLT appears preferable to other social-cognitive models such as the theory of planned behaviour (Azjen, 1991) which considers the intention to perform a

behaviour and the perceived behavioural control over that behaviour. Instead, Akers' SLT focuses upon the influence of other people who are important in the lives of the young novice, such as their parents and their peers, and how reinforcement can shape attitudes and behaviours.

Akers' SLT emerged in the 1960's and is a criminological application of traditional social learning theory principles of a decade earlier (Bandura et al., 2003). The theory recognises that behaviour such as risky driving is learnt by observation and imitation of significant others. These significant others reinforce driving behaviour through the administration (or the lack of administration) of punishments and reinforcement (herein referred to as rewards) (DiBlasio, 1987). Accordingly young novices subsequently perform *conforming* driving behaviours (following all road rules) or *deviant* driving behaviours (not following all road rules, herein referred to as risky driving) (Akers & Sellers, 2004). For young drivers, the significant others who administer these rewards and punishments most often are their parents and friends (Scott-Parker et al., 2009a); however the police as enforcers of road rules can also be influential (DiBlasio, 1987).

Rewards for conforming and risky driving can be positive (non-social rewards include feelings of excitement; social rewards include improved status in a social group) or negative (lack of punishment for risky driving such as driving in excess of posted speed limits). Punishments for conforming and risky driving can also be positive (non-social punishments include feelings of fear and removal of driving privileges through licence suspension or lack of access to a vehicle; social punishments include social censure such as berating by friends) or negative (friends did not reward nonconforming or risky driving behaviour as expected) (Akers, 2009).

Akers' SLT has been operationalised in quantitative young novice driver research, and has been found to explain a significant amount of variance in their risky driving behaviour. Imitation of parents and friends, and rewards and punishments anticipated from both parents and friends were significant predictors of young novice drivers' risky behaviour (Scott-Parker et al., 2009a, b). Akers SLT has had limited application in qualitative driver research (e.g., speeding by Australian drivers, Fleiter et al., 2010), but when used in this way has allowed insights into the nature of risky driver behaviour that are unlikely to be accessible through quantitative methodologies. The research strategy to be adopted in the research

reported here is that of guided qualitative content analysis (Graneheim & Lundman, 2004). The relationships between the words spoken by the young novice drivers shall be explored and linkages identified (Bryman, 2008), guided by Akers' SLT. Importantly, the analysis will not simply quantify the number of endorsements for particular constructs of interest which is typical of content analysis approaches.

There is a dearth of research exploring the normative influences of parents, peers, and police on the risky behaviour of young novice drivers, particularly in the Australian GDL context. Focus groups and interviews have explored the negotiation of car use and emergence of identity in teen drivers and have afforded a unique insight into the changing role of the novice driver within the family (Best, 2006) which was unlikely to have been realised through quantitative research methodologies.

Further, recent American research using focus group methodology explored the perspectives of 300 young drivers and interviews with more than 40 young drivers regarding the variables that influence their safety in cars. Whilst the influence of parents, peers and the police were not specifically explored, analysis of the focus group findings revealed that all three groups were influential in the risky behaviour of the young drivers. In addition, whilst the specific constructs of rewards, punishments, disadvantages, imitation and influence were not explicitly explored, the responses of the young drivers could be placed within these themes. The qualitative data informed the development of a questionnaire gauging the experiences and attitudes of young drivers which was administered to 5665 American students (CHOP, 2007, 2009).

In addition, as noted previously, there is also a scarcity of research utilising Akers' framework to guide qualitative research in road safety. Countermeasures designed to ameliorate the risky behaviour of young novices, and the injuries and fatalities arising from crashes that result from such risky behaviour, have largely been developed without asking young novice drivers about their experiences, and indeed who the important persons and groups within their lives are, and how these people influence their behaviour. A qualitative approach is therefore likely to provide greater insight into young novice driver experiences, and consequently better inform and guide countermeasure development and evaluation.

8.3.3 Study aims

The goal of the research was to identify key themes related to the risky behaviour of young novice drivers. Drawing on Akers' framework, the study was designed to explore the nature of *imitation* and the influence of parents and peers, the *rewards* and *punishments* administered by parents, friends, and the police as potential influences in the risky behaviour experiences of the young novice driver. For example, the anticipated rewards construct of Akers' social learning theory explores the rewards that the young driver anticipates for performing risky behaviour. Without actually speaking to young drivers themselves, road safety researchers can only presume – possibly erroneously – what these rewards are. The interview questions accordingly were designed to explore the constructs of interest, therefore the guided qualitative content analysis focuses on the sub-themes, codes, and meaning units (elaborated upon in 8.4.3) that explain each of the themes for the young novice driver.

8.4 Method

8.4.1 Participants

Purposive sampling was used to recruit 21 young drivers (12 females, 9 males) aged 16 to 25 years (M = 17.71, SD = 2.15) with a Learner (n = 11, 6 females) or Provisional (n = 10, 6 females) driver's licence. The Learners had held their licence for between 4.5 months and 2 years (average duration = 10.4 months); and the novices with a Provisional licence had held their licence for between 1 month and 3.5 years (M = 8.9 months). Females had held their driver's licence on average for 9.9 months (range = 4.5 months – 3.5 years); males on average for 9.4 months (range = 1 month – 2 years).

8.4.2 Design and procedure

Pilot research undertaken with young novice drivers (preliminary small group interviews, unpublished, which informed the research of Scott-Parker et al., 2009a, 2009b) explored the perception of transgressions of road rules by the target group. Young novice drivers reported that 'minor' transgressions such as speeding by 5 kilometres per hour, illegal U-turns and texting whilst driving were only 'bending' the road rules, whilst in contrast 'major' transgressions such as speeding by 20 kilometres per hour and driving through a red light were 'breaking the road rules'.

Therefore the first question asked in the current interviews was *"What is the difference between bending and breaking the road rules?"* Accordingly every question regarding the normative influences of parents, friends, and police on young novice driver behaviour, and explorations of advantages and disadvantages of road rule transgressions incorporated *both* terminologies to ensure that the full novice experience was captured. As can be seen from Appendix C, questions 2 – 6 were designed to explore Akers' construct of differential reinforcement which considers the rewards and punishments anticipated from and received for risky driving behaviour, and questions 7 – 10 were designed to explore the construct of imitation.

During the second week of the summer school holidays (the main holidays of the academic year, of six weeks' duration), young persons who appeared to be of the age at which they typically would have a novice driver's licence (Learner or Provisional) visiting the food court vicinity of a major metropolitan shopping centre between 9 am and 12 midday were approached. It was expected that this would provide a setting in which a range of novice experiences could be gathered in an environment which is very popular, comfortable, and familiar to the participants. The consistency of data collection was enhanced by interviewing only during this week, indicating a dependable (methodologically valid, reliable and rigorous) approach to the content analysis which was undertaken in the same venue during the morning only and over a short period of time (Graneheim & Lundman, 2004).

Each individual was asked if they had a novice driver licence. If they responded 'yes', they were told about the research aims and procedure, and were offered the opportunity to participate in recorded 20-minute interviews (on average depending on the number of interviewees) about their driving experiences and attitudes. In return they received $20 for their time. If the novice was alone (3 females and 2 males, 1 each of whom held a Learner licence), an individual interview was conducted. If the novice was with a group of friends, the researcher clarified that all group members were young novice drivers, and a small group interview was conducted. Consequently participants were interviewed either individually or in small groups of up to four participants, some comprised of mixed gender and mixed licence levels.

As young novices drive both alone and with passengers, and with passengers of same and/or different gender, this approach allowed insight into influences within each travel mode. The inclusion of both small group and individual interviews

allowed a triangulation of findings sourced through each method (Liamputtong & Ezzy, 2005), enabling a more comprehensive consideration of Akers' constructs as they pertain to the risky behaviour of young novice drivers. Consistent with ethics requirements participants were given a participant information sheet. They also completed a consent-to-participate form and a brief demographic questionnaire self-reporting their age, gender, type of novice driver licence and how long they had held this licence. Recruitment ceased when it became apparent that saturation of responses, including for each gender and each licence level (also see 8.4.3), had occurred (Liamputtong & Ezzy, 2005). All interviews were transcribed verbatim.

8.4.3 Data analysis

The first author conducted the interviews with a research assistant. The assistant transcribed the recordings verbatim within 48 hours of their completion; their integral involvement in recruitment, interviewing, recording and timely transcription helped ensure the dependability of the analyses (Graneheim & Lundman, 2004). The first author recorded memos both during and after the interviews summarising key points whilst reflecting upon the larger themes, and upon receipt of the transcriptions continued the reflection upon the interview content. In particular, the content was reflected upon and considered both in its entirety and for each gender and each novice licence level separately, allowing the identification of response saturation. The co-authors were consulted regarding the codes and sub-themes identified by the first author. In addition, analysis of transcripts occurred over an extended period of time, allowing the authors to develop a coherent guided thematic content analysis.

The unit of analysis in this paper is the transcribed interview text regarding the young person's experiences of being a novice driver. Initially the interview texts were analysed question by question to focus upon the key components of Akers' SLT. The text was considered within the context of the memos noted during and shortly after each interview, and analysis commenced with the first interview. Considering the overarching processes within Akers' SLT and the discussions within both the group and the individual interviews, the interviews were initially sorted into four content areas: (1) the influence of parents, (2) the influence of friends, (3) the influence of Police, (4) the influence of the graduated driver licensing program.

However as the content analysis continued, it became apparent these divisions which reflected the overarching sources of influence consistent with Akers' SLT were unsuitable. The following content areas provided a better fit with the data and were also guided by the tenets of Akers' SLT: the influence of (1) parents and (2) friends including imitation; (3) punishments for risky driving anticipated from and administered by parents, friends and the police; and (4) rewards for risky driving behaviour anticipated from and administered by parents, friends and police. A review of the memos recorded during the interviews led to the influence of friends and parents (themes) being further divided into 'no', 'indirect', and 'direct' influence (sub-themes).

Content analysis was commenced by systematically dividing the transcript texts into meaning units (Mayring, 2000). All meaning units were comprised of the exact phrasing used by the young novice driver to explain their experience. Direct quotes were labelled male (M) or female (F), followed by the driver's age in years, and whether they had a Learner (L) or Provisional (P) licence, such that "L17M" represents a quote from a 17 year old male driver with a Learner driver licence. Meaning units were condensed and then abstracted and given a code that grouped the condensed meaning units according to a focal meaning in accordance with the guidelines of Graneheim and Lundman (2004).

To illustrate, the whole sentence "*Um, like easier to get places and stuff like that*" (L17F) (transcribed text) uttered in response to the question "What are the advantages of bending or breaking the road rules?" was deconstructed (Weber, 2004) to the meaning unit of "*easier to get places"* (L17F). This meaning unit and the meaning unit "*get there quicker*" (P18M) were combined to form the condensed meaning unit labelled 'Instrumental rewards for risky behaviour'. This condensed meaning unit was subsumed within the code 'Non-social reward for risky driving'. Codes were grouped into sub-themes, and in this example the sub-theme became 'Experience reward for risky driving'. This code was part of the 'Reward' theme, one of the four themes that reflected the manifest content which was guided by the framework of Akers' SLT.

All codes, sub-themes and themes were constantly compared by the authors throughout the content analysis. Whilst this approach is consistent with a grounded theory analysis, the qualitative content analysis was guided by Akers' SLT constructs and therefore differs from a grounded theory analysis (Liamputtong &

Ezzy, 2005). It is noteworthy that the themes capture the content of the entire transcripts. It is also notable that whilst four themes dominate and are considered separately within the discussion (see 8.5), theme two capturing punishments for risky driving behaviour contains considerably more meaning units than the remaining themes. This perhaps reflects not only the content and duration of the interviews attributed to this dimension of influence, but may be interpreted as suggesting that this influence is important in the risky behaviour of the young novice. Such a determination is beyond the scope of the current analyses, and future qualitative or quantitative research should examine the level of importance – and the type of influence – of each of the four themes.

8.5 Findings and Discussion

Interestingly a similar pattern of responses regarding the difference between 'bending' road rules and 'breaking' road rules occurred as was found in the pilot research. In addition, the novices appear to have insight into the nature of their transgressions (e.g., "*bending the road rules is pretty much the same as breaking them but I guess people would argue that bending it means you don't get caught, breaking it means you do"*, P18F; "*bending is rules that you don't think are right. Breaking are, they put them there to keep them alive*", P18M; "*you don't really do anything that's bending them without breaking them*", L17M).

Regarding the thematic analysis, four themes of (1) rewards for risky driving behaviour, (2) punishments for risky driving behaviour, (3) influence of parents on risky driving behaviour, and (4) influence of friends on risky driving behaviour will be discussed according to the sub-themes emergent within each theme.

8.5.1 Theme 1: Rewards for risky driving behaviour

Table 8.1 summarises the content analysis for the theme of rewards for risky driving behaviour and reveals there are five condensed meaning units, four codes and three sub-themes.

8.5.1.1 Sub-theme 1: Experience reward from risky driving

All participants, irrespective of age, gender and licence, were able to identify rewards for risky driving behaviour. These rewards included the experience of social rewards and non-social rewards. Novices of all ages, genders and licence readily

reported a variety of social rewards for risky driving, and these consisted of their friends who would "*cheer you on*" (L17M) and "*tell you to do it again"* (L16F). These social rewards encourage the risky behaviour for which the reward was received (Brown, Bakken, Ameringer, & Mahon, 2008). Instrumental rewards – whilst non-social in this instance – may also be social, particularly if the desire to spend more time with friends was the motivating factor for driving in a risky manner (e.g., speeding).

Whilst not explicitly explored in the current study, car ownership, and, for males in particular, the type of car and the perceived capabilities of the young driver in that car can also be rewarding. The vehicle can also be instrumental in presentation of a desirable image among the young novice driver's social group (Redshaw, 2006). A range of non-social rewards such as experiencing pleasurable emotions and a faster journey were also reported. In previous research, rewards correspond to a greater likelihood that a behaviour will be repeated (Price & Archbold, 1995; see also Cooper, May, Soderstrom, & Jarjoura, 2009; Higgins, Mahoney, & Ricketts, 2009).

8.5.1.2 Sub-theme 2: Negative reward

A lack of police punishment for transgressions was also rewarding, and some of the females with Learner licences believed that the Police were more lenient because they were Learners and therefore they could feign a lack of knowledge or a mistake to avoid punishment for wilful risky driving behaviour. Such negative reinforcement (a lack of punishment) (Price & Archbold, 1995) is considered to have the same effects on risky driving behaviour as positive reinforcement, i.e., it increases its likelihood (Akers & Sellers, 2004; Winfree & Bernat, 1998). In addition, this experience of negative reinforcement may also contribute to the development of the novice drivers' social identity through increasing their standing within their social group; an assumption requiring further exploration.

8.5.1.3 Sub-theme 3: Reward from needs being met

Interestingly only novices with a Provisional licence disclosed that risky driving was a means of developing and defining their identity. This perhaps reflects that young novice drivers are adolescents, and as such are experiencing considerable personal development (Vanzetti & Duck, 1996). As Learners, these Provisional drivers had to

Table 8.1 Rewards for Risky Driving – Sub-Themes, Codes, Condensed Meaning Units and Meaning Units

Sub-Theme	Code	Condensed Meaning Unit	Meaning Unit[1]
Experience reward for risky driving	Non-social reward for risky driving	Instrumental rewards for risky behaviour	Get there quicker (P18M) Easier to get places (L17F)
		Positive emotional response for risky driving behaviour	Seems more fun than what everyone else is doing (P18M) Thrill of everyone going so easy on you because you've only just started (L16F)
	Social reward for risky driving	Friends encourage risky behaviour with direct reward	If you had stupid friends...they'd say "Oh you should do it again ...because you're so cool" (L16F)
Negative reward	Punishment avoidance	Avoid detection of risky behaviour by Police	No-one's going to catch you (P22F)
Reward from needs being met	Maturational issues psychosocial	Risky behaviour helps define identity	Be yourself; try to be different (P17M) Feel like you're in control...of your own choices and the vehicle and stuff like that (P24F)

[1] All Meaning Units are direct excerpts from the transcripts. Illustrative quotations are provided.

drive with a supervisor, frequently a parent (Queensland Transport, 2007a; Scott-Parker, Bates et al., 2011). However as Provisional drivers, they can drive alone, and when accompanied are more likely to carry young passengers who are their friends and therefore integral to their psychosocial development (Scott-Parker et al., 2009b). The young novice driver is also a young adult who is maturing physically, psychologically and socially, and as part of this maturation is forging their self-identity. Self-identity is constructed through self-categorisation and internalisation of group norms, attitudes and behaviour standards (Tajfel & Turner, 2003), and driving independently with friends further facilitates the development of their social identity. The influence of psychosocial development and maturation upon risky and conforming behaviour requires further elucidation that lies beyond the scope of the current research.

8.5.1.4 Summary: Theme 1

The application of SLT to the reduction of the incidence of young novice driver risky behaviours entails minimising the rewards they experience for risky driving. Some of these rewards can be directly addressed, for example education campaigns could target youth and discourage them from rewarding the risky driving of their friends. Some rewards, such as an inadvertent reward in the form of a lack of punishment, fall within the scope of government authorities, particularly the discretionary authority of the Police. Other rewards may be more difficult to address, such as maturational needs that are being met by the risky behaviour.

8.5.2 Theme 2: Punishments for risky driving behaviour

Table 8.2 summarises the content analysis for the theme of punishments of risky driving and shows that there are 30 condensed meaning units, 12 codes and 5 sub-themes.

8.5.2.1 Sub-theme 1: Social punishment

The sub-theme of social punishment included the young novice driver inflicting harm upon other road users, such as "*make roads more dangerous for everybody else*" (P17F).

Table 8.2 Punishments for Risky Driving – Sub-Themes, Codes, Condensed Meaning Units and Meaning Units

Sub-Theme	Code	Condensed Meaning Unit	Meaning Unit[1]
Social punishment	Inflict harm	Potential harm to others	Injure someone else, ruin someone's life (P24F, L17F)
Non-social punishment	Incur harm	Potential harm to self	If this happened I could die (P22F)
		Negative emotional response	Feel really guilty about possible injuring that person (P24F) Scary, you know how much can go wrong (P22F)
	Incur loss	Potential damage to property	Damaging your property or your car (P22F, L17F)
		Potential costs/legal consequences	Consequences if you get caught (L18M, P22F) Pretty good incentive to...not do it or get smarter (P17M)
		Loss of mobility	You'd have no car, you couldn't get anywhere (P21F, L16M) You gotta call on your mates to come and pick you up (P18M)
		Delay caused by third party	If it goes through insurance it takes ages (L16F)
		Consequences for GDL progression	Makes it a lot harder to get your P's and your Open's when you get to it because of the points on your Learners (L17M)
Punishment by friends	Friends unlikely to punish	Friends unlikely to punish risky driving behaviour	Don't think they be that too concerned. It's your licence, you're going to lose it, they don't care (L18M)
		Friends travelling as passengers unlikely to mention risky driving	They're driving in your car so they won't really say too much (L18M)
		Emotional response to friends being unlikely to punish risky driving	If I did bend them they wouldn't say anything which is kind of scary because it's their lives that I'm driving (P17F)
		Friends unlikely to mention risky driving as they also are risky drivers	Don't ever really tell me off because they do the same (P17M)
	Friends likely to punish	Friends likely to mention risky driving behaviour	Goody-two-shoes would be like "Oh you can't do that" (P21F) Get annoyed but they'd just laugh...tease me about how much I gotta pay and stuff like (P18M)
		Friends react strongly to risky driving behaviour	Very shocked...not that sort of person (P22F) Some of my friends would be freaking out because they'd be really scared...drink driving...tell me off (L17F)
	Reactions of friends influenced by other variables	Age influences reactions of friends to risky driving behaviour	I guess we're at that age...burnouts...to fit it (L16F) Older friends would tell me off and the ones my age and younger would just have a bit of a laugh (P24F)

Sub-Theme	Code	Condensed Meaning Unit	Meaning Unit[1]
		Outcome influences reactions of friends to risky driving behaviour	It depends what happens. If nothing bad...they'd probably tell you to do it again...but...something bad did...be upset (L16F)
Punishment by parents	Parents unlikely to punish	Parents unlikely to mention risky driving behaviour	I've been in the car with them and broken the road rules and they didn't say anything (L17M)
		Parents not punish, unsympathetic	(Lost car and said) Get on your bike (P18M) She'd say it's your licence, if you do it you've got to pay the fine (P17M)
		Parents not punish, emotional response only to risky driving behaviour	Disappointed...very, very disappointed in me.... they're not big on punishments or consequences I guess (P22F) No (punishment) because they expect me to be able to make the decision for myself (P18F)
	Parents likely to punish	Parents likely to react to risky driving behaviour	Just give me a warning and tell me not to do it again (L16M) Yelling...angry (P21F, L16F)
		Parents react strongly to risky driving behaviour	My mother would freak out. She'd yell at me...stop me from driving the car...I didn't stop at a red light at the end of (school) term 4...wouldn't let me drive...for 2 weeks (P17F)
	Reactions of parents influenced by other variables	Motive for risky behaviour influences reactions of parents	If it was an accident...I'm still on my L's (L17M) If I did it on purpose they'd probably be pretty angry (L17M)
Punishment by Police	Police unlikely to punish risky behaviour	Inconsistent experience of Police Police failed to detect rule violation	I've been pulled over...7 times...all Police are different (P21F) Didn't realise I had no P Plates on (P17M)
	Police likely to punish risky behaviour	Police react to risky driving behaviour	Fines, demerit points, permanent record (P17M, L16F) They'd go spastic, they'd be worse than our parents (L16F)
		Accept Police authority	They just have to do their jobs...punish me (L17M) Don't think they're very tolerant. Especially of young drivers breaking the road rules (P22F)
		Do not accept Police authority and feel persecuted for being a young novice driver	They always seem to be picking on anyone with a P plate... targeted me cos I've got a P plate and its really starting to annoy me (P17M)

Table 8.2 (Continued)

Sub-Theme	Code	Condensed Meaning Unit	Meaning Unit[1]
			Reason we have to wear...P plates...so...can pull us over (P17M)
		Recognise are a member of an at-risk group of drivers	Being a P plater, kinda got a stigma attached to us, probably for a good reason (P24F)
		Unable to avoid Police punishment	I can't talk my way out of it – I had my car impounded for 24 hours and had to go to Court a couple of weeks ago (P17M)
	Reactions of Police influenced by other variables	Talked self out of ticket as Police did not want to do paperwork	Depends on what you did...on my L's I could've gotten my car impounded for 24 hours and my licence suspended, talked my way out of that ...didn't want to do that paperwork (P18M)

[1] All Meaning Units are direct excerpts from the transcripts. Illustrative quotations are provided.

8.5.2.2 Sub-theme 2: Non-social punishment

The sub-theme of non-social punishment included the young novice driver incurring harm and incurring loss. Incurring harm included causing harm to themselves, in particular death; and the negative emotional responses associated with such harm, including "*embarrassment of even having a crash and getting caught*" (L16F). Incurring loss comprised damage to their own property or that of other persons, costs and legal consequences such as "*getting caught by the Police*" (P22F), loss of mobility as a result of damage to their own car, legal consequences such as "*losing your licence*" (P22F), "*having to use parents*" (L16F) to get around, and time delays from waiting for car repairs to be undertaken. Such anticipated loss of autonomy and freedom can reduce the likelihood that risky behaviour is undertaken (Best, 2006). It is noteworthy, however, that the non-social punishments may also have social aspects to them, particularly if the mobility is used for social purposes, and as such a loss of mobility indirectly affects social rewards.

Male novice drivers were also aware of the consequences for their progression through Queensland's GDL program, in particular the difficulties arising from accumulating demerit points and having licence suspensions at either novice level. This influenced their driving behaviour, for example "*not do it or get smarter about it*" (P17M). 'Not doing it' is behavioural change consistent with Akers' principles which assert that punishment reduces the likelihood the behaviour will be undertaken (Brezina & Piquero, 2003). However, 'getting smarter about it' suggests that the young novice has devised mechanisms to avoid this punishment without ceasing the behaviour, and therefore the behaviour is not likely to reduce, rather it may be undertaken under more risky circumstances, such as at night and in isolated areas. Friends were involved in the process of 'getting smarter', and structuring opportunities (Brown et al., 2008) such as suggesting times and locations that police detection of risky driving is unlikely to occur also increases the likelihood that risky behaviour will be undertaken.

Risky behaviour resulting in incurring harm such as personal injury or injury to others was only mentioned by *female* novices. This difference may reflect gender-based optimism bias (Weinstein, 1980) on the part of male novices, none of whom reported any harm to themselves or other road users as being a disadvantage of risky driving behaviour. *Male* novices contributed many responses to the condensed meaning units 'potential costs/ legal consequences' and 'loss of mobility'. Potential

costs were an incentive for male drivers to be less risky. This suggests that more tangible consequences are influential in changing the risky behaviour of male young novice drivers. Such a supposition is endorsed by the behaviour change that was reported by two male participants who had either directly or vicariously experienced negative consequences to risky driving and subsequently modified their behaviour: "*had car slide out...sensitive to feeling in skid...take the corners a bit slower now"* (L17M); and "*saw my mate roll his 4WD in front of us...so I know the limits and it changes your perspective of what they can do*" (P17M). These findings have implications for countermeasures targeting risky behaviour by novices: focusing on incurring loss and tangible costs may be more effective for male novices, whilst focusing on incurring harm to themselves or other road users may be more effective for female novices.

8.5.2.3 Sub-theme 3: Punishment by friends

The punishments administered by friends were also perceived as influential. Friends were likely to punish risky driving that was seen by the young novice driver as very risky, such as "*20 km or over*" (P17M), out of character for the novice, or if the friends were not risky drivers themselves. The type of punishment varied widely from passing comments, to getting "*annoyed*" (L17F), to "*definitely discourage*" (P22F).

The sub-theme of punishment from friends indicated however that friends did not always punish risky driving behaviour, with novices of all ages and genders with a Learner licence believing that their friends would not say anything about their risky behaviour because they "*simply wouldn't care*" (L16F). Given that these drivers were Learners, their answers may have been hypothetical: they may not have driven with peer passengers, and if they had, their peers may have deferred to the driving supervisor(s) the responsibility for giving feedback. In contrast, none of the novices with a Provisional licence reported that friends would not punish risky driving, suggesting that such independent novices have indeed been punished by their friends for risky driving, either whilst they were their passengers or not.

Friends travelling as passengers of the young novice were also perceived as having no right to mention risky driving behaviour. However, the notion that friends would not speak out was found to be emotionally disturbing to one female novice who felt great responsibility in carrying her friends as her passengers. The reactions

of friends were also influenced by other variables, including the age of the friends in relation to the novice, such that older friends would punish the behaviour whilst the friends of a similar age or younger would encourage the behaviour, reflecting the developmentally-pervasive drive for the adolescent to fit in with their social group (Bonino et al., 2003; Sebald, 1992). Conformity to the norms of their social group (Prinstein & Dodge, 2008) and the lack of punishment for risky behaviour is unlikely to reduce the incidence of risky behaviour, per Akers' principles (Preston & Goodfellow, 2006). Believing that others in the social group would expect the novice to drive in a risky way, and anticipating that this behaviour would be rewarded, also provides motivation for risky driving (Gibbons, Pomery, & Gerrard, 2008; Winfree & Bernat, 1998).

Friends' reactions were also dependent upon the outcome of the risky behaviour; friends only punishing the young novice *if* their risky behaviour resulted in a *negative* outcome such as a crash. Such conditional punishment again is unlikely to reduce the incidence of risky driving (Bandura et al., 2003), and this is a concern for road safety as negative outcomes such as car crashes, whilst more likely if the young novice engages in risky driving, are a relatively rare occurrence that do not arise after every incidence of this behaviour (Vassallo et al., 2008). The lack of punishment by friends is problematic for the risky behaviour of young novice drivers, because if they believe their friends are not going to punish them for risky driving behaviour, they are unlikely to drive in a less risky fashion per Akers' SLT.

There appears to be some potential for friends to change young novice driver behaviour (Miller, 2010), for example, when the chief investigator asked a group of male novices if the opinions of their friends mattered, one responded "*if they think I am a bad driver I want to change that because they have to be in the car with me, so I don't want them to think that*" (L17M). The reactions of friends in this instance are critical, and may therefore be a mechanism for encouraging less-risky driving behaviour in the young driver population generally (Buckley & Sheehan, 2008).

8.5.2.4 Sub-theme 4: Punishment by parents

Punishment by parents was also seen as pivotal in novice risky behaviour: "*you've gotta listen to them don't you? You live with them*" (P17M). The sub-theme of punishment from parents revealed that the same pattern of codes emerged, that is some novices reported that their parents were not likely to punish their risky

behaviour, others that they were likely to punish risky driving, and that the reactions of some parents was influenced by other factors.

A male Learner reported he had broken road rules whilst his parents were supervising his driving and he had not been corrected, nor punished, at the time or after the event. Driving with a Learner licence is the time when the young person is developing the skill of driving, and therefore the time when errors should be corrected before they become driving habits. Parents frequently take on the role of supervisor throughout this period (Scott-Parker, Bates et al., 2011), and they may do so for a number of reasons including the expense of professional driving instruction. If they decide to be a supervisor, they teach the young person the skills and knowledge needed to not only operate the vehicle, but to follow the road rules when they are driving. They as supervisors are also uniquely positioned to monitor compliance with road rules, to notify the Learner of their transgressions of the road rules, and to encourage compliance and this can be through such mechanisms as punishment. Research supports the benefits of consistent and clear correction of driving errors by the novice (e.g., Prato et al., 2010). Modelling risky behaviour, and such a lack of correction and punishment, is unlikely to reduce the incidence of risky driving, per Akers' SLT (Krohn et al., 1985; Winfree and Bernat, 1998).

The motive for the risky driving was also thought to influence the reactions of the parents. Novices stated that if it was accidental or part of the learning process their parents would be more understanding and lenient, whilst if the risky driving was deliberate they expected a stronger reaction. Male drivers with a Provisional licence in particular reported that their parents were unlikely to be sympathetic if they were caught breaking the road rules and that rather than punishing the novice directly themselves, they would ensure they suffered the punishments imposed by the police. To illustrate, in the circumstances that a fine was issued, they would have to pay this themselves rather than rely on their parents to pay it, and when their car had been impounded, they had to find alternative means of transport and they were not allowed to use their parents' car(s). Whilst not punishing the novice themselves, parents ensured that they did not minimise the punishments administered by the Police and this is likely to reduce the incidence of risky driving in accordance with Akers' SLT assertions.

It is noteworthy however that the lack of additional punishment by parents of the novices may contribute to feelings of confusion surrounding their parents'

expectations of driving behaviour (Nygaard & Grube, 2005), in particular whether they endorse the formal sanctions or not, and this confusion may diminish the punitive impact associated with Police detection of offences. To ameliorate this lessening in punitive impact, parents could be encouraged to administer their own punishments in addition to formal sanctions.

Parents also used emotional punishment, being "*disappointed*" (L17F) as they expected the novice to make responsible decisions. The effect of such a punishment is unclear. One female novice also felt that her parents would "*be too scared to drive with me*" (L17F) if she did any risky driving, and that this would impact on her ability to accrue hours for her logbook and she was therefore motivated to follow all the road rules.

Other novices expected their parents to react very strongly, and some of this expectation was based on past experience with risky driving and parental punishment. Parents would "*restrict...where...can and can't drive*" (P17M) or "*take something off you or just not give you money or something*" (P19F). Such strong punitive reactions are likely to reduce the incidence of risky driving behaviour (Hwang and Akers, 2003). Novices also acknowledged that this response may be because the parents recognised that they themselves are risky drivers, and "*they don't want me to end up as a driver like they are*" (P24F). However in this case, the novice is again exposed to conflicting messages (Nygaard & Grube, 2005) and exposed to a risky role model to imitate for many years prior to gaining their own licence, both of which may neutralise any benefits from punishing risky driving behaviour.

Parents may feel they are unable to influence the risky behaviour of their novice with a Provisional driver licence (e.g., Simons-Morton et al., 2002), however the small group interviews reveal that parents are integral (Kim, Kwak & Yun, 2010) to the risky behaviour of the young novice driver. For example they are frequently the provider (e.g., Nygaard & Grube, 2005) of the vehicle in which the novice engages in risky behaviour. Countermeasures could encourage parents to not only be non-risky driving role models for their children, but emphasise the importance of negative consequences for risky driving behaviour by the novice. Furthermore, GDL programs are an additional ally for parents when imposing driving conditions and restrictions (e.g., Simons-Morton et al., 2002; Williams et al., 2006).

Parents and their novice driver children have been found to differ by a substantial amount in their knowledge of exactly what the novice's driving rules are and the consequences of violating these (Hartos et al., 2004). Parents also may not understand the breadth and nature of risks faced by their novice children, and in particular the role they can play in minimising these risks (Williams et al., 2006). Accordingly parents should be encouraged to explicitly set rules and consequences for breaching these rules with the young novice prior to any young novice driving, but particularly before independent, unsupervised driving (Simons-Morton et al., 2006b).

8.5.2.5 Sub-theme 5: Punishment by Police

The sub-theme of punishment by police indicated that the novice driver expected or had experience of the police not punishing risky behaviour. Success in talking their way out of a ticket frequently involved a personal appraisal of the skills and discretionary authority (Travis, 2005) of the Police Officer involved. Police also failed to detect violation of road rules, including restrictions and conditions specific to the GDL program. Novices felt the punitive reactions of the police were dependent on other variables, "*on what it was...how I had behaved...very conditional on all of those*" (P22F). This has consequences for the risky behaviour of young novice drivers, "*I've been pulled over four times and they've let me go all four times for not wearing P plates. So like that just makes me not even wear them anymore*" (P18F).

Accordingly the young novices continued their risky driving behaviour, and conflicting messages (Nygaard & Grube, 2005) regarding risky driving perceived by the young novice driver appear to negate any benefits intended by such community policing. Warnings from police regarding risky driving may not be effective in behaviour change, for example, drivers in Maryland who were detected speeding and did not incur any legal consequences were re-detected for another speeding offence sooner than those who did incur a legal consequence (Lawpoolsri & Braver, 2007).

Although non-punishment by Police was reported, punishment of risky behaviour was also reported, with novices of all ages, gender and licence able to provide examples of anticipated police reactions such as "*community service or something*" (L17F) and "*spend the night in jail*" (L16M). These reactions were likely

to reduce the performance of risky behaviour, consistent with Akers' assertions (Watson, 2004a).

The novices were divided into those who accepted the authority of the police, and those who did not. The latter group was further able to be divided into two sub-groups, one of which was comprised only of males on a provisional licence who had strong feelings of persecution by the Police for being a novice driver, and their reactions were mixed, "*when you're a P-plate you're a magnet for cops so...you gotta watch out*" (P17M), and "*got to keep them (P Plates) up, want to keep your licence*" (P17M). These novices monitored police presence on the road and were asked to share this information with older novice siblings. They also attempted to avoid detection by police by not travelling routes frequented by police operations such as speed cameras and random breath (alcohol) tests.

The other sub-group was comprised of novices who had received only a warning from the police for their risky behaviour, and these novices did not change their behaviour to a less-risky pattern, reflecting upon these persons of authority with some disdain. Such behaviours have implications for risky driving, as punishment avoidance reinforces risky behaviour (Fleiter et al., 2010). In contrast, the first group of novices accepted that they were a vulnerable group of road users, and that "*they'd* (the police) *be more harder on young people than they would be on older people*" (P19F), suggested "*because they see the badder things that happen all the time*" (P21F). These statements appear to indicate also that the young novice driver respects the authority of the police and that the police are upholding legislation enacted to protect them as vulnerable road users.

8.5.2.6 Summary: Theme 2

To summarise, both non-social and social punishments from parents, friends and the police are influential in the risky behaviour of young novices. Consistent with Akers' assertions, punishment for risky driving behaviour is likely to lead to the desired behavioural change in the young novice driver. Future research should also explore the circumstances in which novice drivers believe their friends and parents should impose punishments. Possible countermeasures include targeted education programs encouraging friends and parents to punish risky behaviour, and highlighting the potential harms for female novices and potential costs for male novices.

8.5.3 Theme 3: Influence of parents on risky driving behaviour

Table 8.3 summarises the content analysis for the theme of the influence of parents on risky driving behaviour and reveals there are 13 condensed meaning units, 6 codes and 3 sub-themes.

8.5.3.1 Sub-theme 1: Parents no influence on novice behaviour

The sub-theme of parents having no influence on novice behaviour indicates that the novice does not imitate their parents' driving, whether it is risky ("*my Mum drives pretty fast, so I don't go that fast*", P21F) or not ("*I speed and they don't*", P18F).

8.5.3.2 Sub-theme 2: Parents indirect influence on novice behaviour

Parents also have an indirect influence on novice behaviour (sub-theme 2), novices seeing the non-risky way their parents drive and choosing to drive the same way ("*I try to drive like him* (Dad)", L16M), or seeing their risky driving and choosing not to drive that way ("*my Mum has road rage sometimes...and I'm like "Mum, just calm down."*", L17F). In the interests of road safety it is positive that some novices *do not* imitate the risky behaviour of their parent. However it is concerning that some novices also advise that they *do* imitate their parents' risky behaviour.

8.5.3.3 Sub-theme 3: Parents direct influence on novice behaviour

Parents are also directly influential (sub-theme 3) upon the risky behaviour of the young novice driver (Bonino et al., 2005). Some Learners being taught by their parents felt their parents were "*more experienced and I guess I am just learning*" (L16F), whilst others felt that they had no choice but to imitate their parents' driving style as they are being taught to drive by them in their car. Furthermore the independent Provisional drivers modified their risky behaviour in response to criticism when their parents were their passengers. Some parents also exhibited extended supervision of novice driving behaviour, monitoring where their novice was driving irrespective of whether they were borrowing the family car or not, novices acknowledging "*they want me to be safe...and not drive stupid*" (P19F).

8.5.3.4 Summary: Theme 3

Road safety countermeasures for novice drivers could highlight the vital role of parental influence and imitation in the risky behaviour of the young novice, and

Table 8.3 Influence of Parents – Sub-Themes, Codes, Condensed Meaning Units and Meaning Units

Sub-Theme	Code	Condensed Meaning Unit	Meaning Unit[1]
Parents no influence on novice behaviour [2]	Do not drive like non-risky parents	Parents not risky drivers, novices do not imitate their behaviour	No. I think they're a bit more cautious...more slow (P22F) No, no way. Dad's like a grandpa, takes ages to get there and (he) just doesn't drive like you're meant to (P17M)
		Parents do not modify their vehicle, encourage novice to do same	Doing up your car, modifications...they don't like it (P18M)
Parents indirect influence on novice behaviour	Drive like risky parents	Parents risky drivers, novices concede self a risky driver	Not at all! They...break the road rules a lot more than I do...Dad on mobile...even though I still do break the road rules (P24F)
		Parents risky drivers, novices imitate their behaviour	Yes apparently I drive like my Mother (told by Father)... passive aggressive (P17F)
	Do not drive like risky parents	Parents risky drivers, novices do not imitate their behaviour	My Mum's a spastic. She's just there screaming and yelling... swearing "Put your indicator on!" (I'm) more patient (L16F) No influence...Because they are terrible drivers and I don't want to drive the same way they do (P24F)
	Some driving like non-risky parents	Parents not risky drivers, novice imitates some behaviour	I do listen to some things they say and other things I think are pretty irrelevant...got to do what I want to do (P17M)
	Drive like non-risky parents [3]	Parents not risky drivers, novice imitates their behaviour	I guess having them as my parents, no matter where I am...that I'll want to do what they think's best so I'll drive safely (P22F)
Parents direct influence on novice behaviour	Drive like non-risky parents	Novice has to imitate parents' driving behaviour	Well, yeah, I have to but (L16F) On my Learner's they're sitting right next to me...direct every single thing I do (L17M)
		Emotional response to need to imitate parents' driving behaviour	I feel under pressure to stay at the right speed...because you feel like they're (Mum/Dad) watching (L16F) Because they're my parents they're meant to know a lot of things about driving. I trust them with everything (L17F)
		Modify behaviour in response to parents' presence and requests	It depends...when they're not in the car I drive how I want but when they're in the car they complain a lot so...I do what they ask...because I don't want to hear it (P18F)
		Novice imitates parents' driving behaviour	Yeah I guess so...they teach me how to drive...so I just drive like they do (L17M)

Sub-Theme	Code	Condensed Meaning Unit	Meaning Unit[1]
			I'm driving their car and they're the ones who taught me to drive and I feel kind of compelled to listen to them (P17F)
		Novice wants to imitate parents' driving behaviour	I try to drive like my Dad cos he's a safe driver (L16M)
			My Dad used to drag race...he's real good with cars...I trust him ...way he drives...want to learn from him as best I can (L17M)
		Parents display extended supervision of novice driving behaviour	I always tell them where I'm going...just so they know where I am and how I'm driving as well (P21F)
			I borrow the car from my Dad so he's got a big say about how I drive, where I drive most of the time (P17M)

[1] All Meaning Units are direct excerpts from the transcripts. Illustrative quotations are provided.
[2] Please note that all meaning units were interpreted from the utterances of the young novice driver. No evidence of direct or indirect influence upon the self-reported risky driving of the young novice was apparent in this Sub-Theme.
[3] Some codes are repeated in different Sub-Themes

encourage this relationship to continue even when independent driving has begun. Parents have consistently been found to be a role model for their children in a range of risky behaviours, including driving behaviour (Prato et al., 2010). The novice driver has been found to imitate the driving style of their parent quite closely in the first stages of independent driving (Lahatte & Le Pape, 2008), a time when the novice is at greatest risk of injury and fatality from a car crash. Therefore parents should be encouraged to be a positive model for their child *even before* they have their novice licence.

Greater leniency and less parental monitoring of driving behaviour has been found to be associated with more risky driving behaviour, which was also evidenced as more offence and crash involvement by young novice drivers (e.g., see Hartos et al., 2000; Simons-Morton et al., 2002). A program such as Checkpoints (see Simons-Morton et al., 2006a) encourages parents to be involved in their child's driving after independent driving has commenced, and has been found to be associated with reduced risky behaviour by the young novice in their earliest stages of independent driving.

Parents in the current study were both a direct and indirect source of influence upon the risky behaviour of young novice drivers. This influence included both positive and negative elements. Accordingly countermeasures like targeted education and advertising campaigns, particularly for the parent of children *before* they receive a Learner driver's licence, could emphasise the potential for them to influence their children to become risky drivers if they observe risky behaviour, thereby stressing the importance of providing a non-risky driving model. Such a program is currently being utilised in Australia to reduce the incidence of binge drinking of alcohol by adolescents and has been found to be associated with increased awareness of risky drinking levels and the importance of modelling responsible alcohol consumption in both parents and their children (Department of Health and Ageing, 2009).

8.5.4 Theme 4: Influence of friends on risky driving behaviour

Table 8.4 summarises the content analysis for the theme of the influence of friends on risky driving behaviour and reveals there are 13 condensed meaning units, 9 codes and 3 sub-themes.

Table 8.4 Influence of Friends – Sub-Themes, Codes, Condensed Meaning Units and Meaning Units

Sub-Theme	Code	Condensed Meaning Unit	Meaning Unit[1]
Friends no influence on behaviour	Do not drive like risky friends [2]	Friends risky drivers, novices do not imitate their behaviour	Because they're lunatics on the road and I'm sensible (L16F)
	Travelling with friends	Friends evoke negative emotional response in novice driver	I would not have clue...too scared to go in (their) car (L16F) I think a lot of my friends haven't been taught to drive properly ...I get really nervous when I'm in the car with them (P17F)
		Friends do not travel with novice	They never drive with me anyway so it doesn't...matter (L16F)
	Friends are not a source of driving influence	Novice does not care what friends think of driving	I don't really care how they drive, if I choose to drive safely... I'm going to do it. I don't care what they say or do (L17M)
		Friends do not have a licence	Most of my friends don't have (a licence) (P21F, L17M)
Friends indirect influence on novice behaviour	Drive like risky friends	Friends risky drivers, novices imitate their behaviour	Yeah...like we think it's ok to go over the speed limit in certain situations because it's accepted within...group (P24F)
	Do not drive like risky friends	Friends risky drivers, novice does not imitate their behaviour	I've got some friends who are really bad drivers, so I wouldn't drive like them (P22F)
Friends direct influence on novice behaviour	Drive like risky friends	Modify behaviour in response to friends' risky presence and requests	If they say go faster or something I'll probably go faster (L16F) They're always telling me to do stuff that's not legal on...road ...go faster...sometimes you do it, sometimes you don't (P17M)
		Friends risky drivers, novices imitate some of their behaviour	Yeah...they speed as well (P18F)
	Drive like non-risky friends	Novice imitates friends' non-risky driving behaviour	Yeah I would...like being aware...like approaching corners too fast when I should've braked a bit earlier (P19F)
		Novice wants to imitate friends' driving behaviour	I watch how they drive because I am in the car with them (L16F)
	Do not imitate risky behaviour of friends	Friends risky drivers, encourage novice to be less risky	Some have had speeding tickets and tell me not to speed as much... look after people in...passenger seat as well (P18M)
	Gender influences imitation	Gender differences in imitation of friends' driving behaviour	Yeah kinda... like female friends, not male (L16F) More fast than my female friends (P17M)

[1] All Meaning Units are direct excerpts from the transcripts. Illustrative quotations are provided.
[2] Some codes are repeated in different Sub-Themes

8.5.4.1 Sub-theme 1: Friends no influence on behaviour

The sub-theme of friends having no influence on novice behaviour indicates that (1) for the young novices, many of their friends did not yet have a licence; (2) Learners may not yet carry friends with them; and (3) female novices in particular avoid travelling as a passenger of their friends for fear of what may happen.

8.5.4.2 Sub-theme 2: Friends indirect influence on behaviour

The sub-theme of friends having an indirect influence on novice behaviour pertains to the novice's friendship group accepting risky driving behaviour, and this increases the likelihood that the novice will drive in a risky way (Brauer, 2009). Novices are vulnerable to perceived group norms and are more likely to comply as they try to establish their self-identity. Novices who are on the cusp of progressing from a Learner to a Provisional driver's licence may be most at risk of negative peer influence as uncertainty about their identity is likely to be greater at that developmental stage, and increased uncertainty corresponds to increased vulnerability and conformity. Such conformity is also more likely when the novice perceives social rewards for the risky behaviour (Blanton & Burkley, 2008), and if the novice is susceptible to the negative influence of their friends (Miller, 2010).

8.5.4.3 Sub-theme 3: Friends direct influence on behaviour

Friends were also found to be a direct influence on the novice's behaviour, with novices consciously (i) driving like their risky friends; (ii) not driving like their risky friends; or (iii) driving like their non-risky friends. Some of the novices, irrespective of age, gender and licence reported that they drove in a risky manner just like their friends, consistent with other research indicating that adolescents tend to engage in risky behaviour such as smoking cigarettes just like their friends (Chen et al., 2001). The novice had been exposed to the risky behaviour of their friends at some point, and these friends served as a role model for driving behaviour (Brown et al., 2008).

Males in particular reported that their friends overtly encouraged them to be risky drivers or encouraged this behaviour simply through their presence in the vehicle ("*a little bit of peer pressure when I get in the car with a few mates*" (L16M). Such peer pressure is normative during adolescence (Nichter, 2010), as is risk taking behaviour which serves many purposes such as the development of identity and autonomy (Bonino et al., 2003). Young male novices also reported they felt

powerless to not drive in a risky way, and the antagonistic behaviours they anticipated from their friends as passengers, such as teasing, were also considered by the driver (Brown et al., 2008).

Novices also reported that they were not influenced by their friends whether the friends were risky drivers or not, "*try to be myself...an individual*" (P17M), "*I basically drive how I think is suitable for...the situation, whether or not they're in the car it doesn't matter because I'm the one driving*" (P18F). Such individuals appear to have established their self identity and therefore appear to be less vulnerable to the negative influences of their friends (Blanton & Burkly, 2008). However it may not necessarily be the case that their driving behaviour is not risky; rather their driving style is risky and that they are not able to be persuaded by their friends to be a less risky driver. This phenomenon requires further exploration in future research.

Risky friends could also exert a positive influence: novices irrespective of age, gender and licence reported they had friends who had undertaken risky driving and experienced a negative outcome such as a crash or a fine and had explicitly told the novice to drive in a less-risky fashion. Other friends were seen as "*lunatics on the road, and I'm sensible*" (L16F). It may be that these novices have developed their identity and are resilient and not susceptible to the negative influence of their friends (Miller, 2010), or that they have an inaccurate perception of their driving skills, abilities, and behaviours (Weinstein, 1980).

8.5.4.4 Summary: Theme 4

Friends again were a source of influence, with both direct and indirect mechanisms, upon the risky behaviour of young novice drivers. This influence included both positive and negative elements (Brown et al., 2008; Prentice, 2008). Accordingly countermeasures such as targeted education and advertising campaigns could capitalise upon the positive direct and indirect influence of friends upon risky behaviour found in the interviews, highlighting their potential power to encourage safer driving behaviour in the young novice. Friends are also influential in the maturation of the individual, and in particular in the social development of the young novice driver. Therefore future research should attempt to elucidate both the nature and the mechanisms of this influence, and specifically the manner and circumstances in which maturation influences the decision of the young novice to engage in conforming and risky behaviour.

8.6 Conclusion

An exploration of the meanings young drivers assign to aspects of their driving such as perceived advantages and disadvantages of risky driving, punishments and rewards received or anticipated from the Police and from the parents and friends of the young novice driver, and if the young novice driver believe that their parents and friends influenced their driving was guided by Akers' social learning theory. It is noteworthy that the participants were young novice drivers recruited from one location over a one week period, and therefore the results may not be generalisable to all young novice drivers. Aspects of the young novice driver experience requiring further investigation – such as the role of maturation and identity issues, and the nature of punishments – have been identified throughout the discussion. In addition, the strength and priority of the influence of the various sub-themes within each theme should be investigated.

The young novice drivers were readily able to cite numerous advantages to risky driving. Females reported potentially incurring harm to themselves or other road users as a disadvantage to risky driving. In contrast, males were influenced by the potential tangible costs of the risky behaviour such as monetary fines. Parents, friends and the police were found to have direct and indirect influence on the risky behaviour through the administration of rewards and punishments. Countermeasures such as education campaigns should target parents and friends, emphasising that it is important for them to model non-risky driving behaviour, and not to reward risky driving behaviour, but to punish it. Parents should also be encouraged to continue monitoring the driving behaviour of their young adults when independent driving has begun. In addition, there is a need for further research into strategies to reduce punishment avoidance among novice drivers and the likely impact of warnings on their behaviour.

8.7 Chapter summary

Chapter Eight reported the thematic content analysis of small group and individual interviews with young novice drivers conducted in a metropolitan shopping centre. Akers' SLT framed the interview questions and the analysis. The four themes of rewards and punishments for risky driving, and the influence of parents and friends, have informed the finalisation of the the Surveys to be used in the remaining Stages. The next paper, Chapter Nine, is the first paper to emerge from

the Learner Survey and is pivotal in the comprehensive investigation of the risky behaviour of young novice drivers. In particular, the impact of the changes to GDL program upon the behaviours and experiences of Learner drivers in Queensland are examined.

Chapter Nine: The Impact of Changes to the Graduated Driver Licensing Program in Queensland, Australia on the Experiences of Learner Drivers

9.1 Notes

Taken from:

Scott-Parker, B., Bates, L., Watson, B., King, M. J., & Hyde, M. K. (2011). The impact of changes to the graduated driver licensing program in Queensland, Australia on the experiences of Learner drivers. *Accident Analysis and Prevention, 43,* 1301-1308. doi: 10.1016/j.app.2011.01.012.

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, and arguments(s), interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online survey and the analysis of the data collected. The second author collected the data for the former-GDL program as part of her PhD program of research and provided assistance with manuscript revisions. The third, fourth and fifth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

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This paper is the second to explore the *behaviour* dimension of Bandura's reciprocal determinism model, the first within the Second (Learner) Stage of the program of research, and the first to explore the driving experiences and behaviours of Learner drivers progressing through an enhanced GDL program *environment*. This paper is pivotal in understanding the impact of the enhanced GDL program, as comparisons are made to the behaviours of Learners who progressed through

Queensland's former-GDL program. The paper also explores some of the self-reported risky behaviours of young novice drivers, such as driving unsupervised, crashes and offences, and submitting inaccurate logbooks.

9.2 Abstract

Purpose: Graduated driver licensing (GDL) has been introduced in numerous jurisdictions in Australia and internationally in an attempt to ameliorate the significantly greater risk of death and injury for young novice drivers arising from road crashes. The GDL program in Queensland, Australia, was extensively modified in July 2007. This paper reports the driving and licensing experiences of Learner drivers progressing through the current-GDL program, and compares them to the experiences of Learners who progressed through the former-GDL program.

Method: Young drivers (n = 1032, 609 females, 423 males) aged 17 to 19 years (M = 17.43, SD = 0.67) were recruited as they progressed from a Learner to a Provisional driver's licence. They completed a survey exploring their sociodemographic characteristics, driving and licensing experiences as a Learner. Key measures for a subsample (n = 183) of the current-GDL drivers were compared with the former-GDL drivers (n = 149) via t-tests and chi-square analyses.

Results: As expected, Learner drivers progressing through the current-GDL program gained significantly more driving practice, which was more likely to be provided by mothers than in the past. In the current-GDL program female Learners reported less difficulty obtaining supervision. The number of attempts needed to pass the practical driving assessment did not change, nor did the amount of professional supervision. Logbook entries were reported to be accurate on the whole. The current-GDL Learners held their licence for a significantly longer duration. A significantly smaller proportion of male current-GDL Learners reported being detected for a driving offence. Female Learners in the current-GDL program reported significantly less crash involvement during the Learner period. Most current-GDL drivers reported undertaking their supervised practice at the end of the Learner period

Conclusions: The enhancements to the GDL program in Queensland appear to have achieved the intended results of Learners increasing the amount of their supervised driving practice. Encouragingly, Learners sampled in the current-GDL program did not report greater difficulty obtaining supervised driving practice, and there was a decline in the proportion of current-GDL Learners engaging in unsupervised driving. More unsupervised driving and more difficulty obtaining driving practice had been suggested as possible unintended consequences of the GDL program reforms prior to their implementation. In addition, the majority of Learners do not appear to be attempting to subvert logbook recording requirements, as evidenced by high rates of

self-reported logbook accuracy. The results may be used to inform the development and the evaluation of GDL programs in Australia and around the world.

9.3 Introduction

9.3.1 The young novice driver

Young drivers aged 17-24 years constitute a major public health concern in terms of the number and rates of crashes in which they are involved, and the resulting injuries and fatalities. Although road crash fatality rates have steadily declined over recent decades, young drivers continue to be killed at rates that far exceed those of older, more experienced drivers (DITRDLG, 2009). There are numerous consistent characteristics evident in young driver crashes, fatalities and offences, including variables relating to the young driver themselves (e.g., their gender, DITRDLG, 2009), their passengers (e.g., their age, Lam et al., 2003), the car they drive (e.g., smaller, older cars, Williams et al., 2006), and when and how they drive (e.g., speeding at night after drinking alcohol, Keall et al., 2004). Moreover, there are a range of psychosocial factors influencing the behaviour of young novice drivers, including the social influence of parents and peers, and person-related factors such as attitudes and sensation seeking (Scott-Parker et al., 2009a, b).

A number of interventions to reduce young driver crash involvement have been implemented in jurisdictions around the world. Driver education, training and media campaigns are consistently found to be popular with the driving public; however there is little evidence that they are effective in reducing the crash and fatality rates of young drivers (e.g., Hedlund, 2007). In contrast, there is growing evidence confirming the effectiveness of graduated driver licensing (GDL) programs, which are designed to improve the safety of novice drivers by acting as a form of exposure control, allowing them to gain more experience under supervision over an extended duration of time in lower-risk driving circumstances (Williams & Shults, 2010).

9.3.2 Graduated driver licensing (GDL)

New Zealand was the first country to adopt a GDL program in 1987, and many jurisdictions around the world have since implemented similar multi-phase licensing systems (Begg & Stephenson, 2003). These programs vary widely in structure and the restrictions contained within, and evaluations of GDL programs have shown mixed but generally favourable results (e.g., Cooper et al., 2005; Rice et al., 2004). The most favourable results are found for GDL programs that incorporate

night time driving restrictions and passenger limits for new drivers allowed to drive unsupervised (Williams et al., 2010).

Table 9.1 outlines the GDL stages, assessments, restrictions, and time constraints implemented in Queensland, Australia, in July 2007 for novices with a Learner licence (herein referred to as the 'current-GDL program'), and that of the previous licensing system (herein referred to as the 'former-GDL program')[3]. A key change in Queensland under the enhanced current-GDL program is that 100 hours of supervised practice is required to be certified in a logbook during the Learner period. Logbook hours must include 10 hours of night driving, a time that is risky for all drivers, and also a time in which novices frequently report little driving exposure (Harrison, 2004). Learners receiving supervision by a professional driving instructor are able to log three hours for each supervised hour, for a maximum of 10 practical hours (which corresponds to 30 hours being recorded in the logbook). It should be noted however that there has been no evidence to date that fewer hours of professional driving instruction rather than more hours of parental instruction improves the driving outcomes for the novice driver. The Learner period was also extended from 6 to 12 months, with a corresponding reduction in the minimum age from 16.5 years to 16 years, to enable Learners to undertake the additional driving practice. In addition, the current-GDL program explicitly addresses the potential distraction caused by the use of mobile phones, either by the driver or by passengers, through prohibiting the use of the mobile phone loudspeaker function by any vehicle occupant when a Learner is driving. Again it should be noted that there has been no evidence to date that such a restriction improves the driving outcomes for the novice driver.

Logbooks are returned to the licensing authority at least two weeks before the practical driving assessment (Queensland Transport, 2007a). Based on research that showed relatively low levels of driving experience prior to licensing (e.g., Harrison, 2004), and that more supervised driving practice during the Learner period has been found to correspond to reduced involvement in car crashes during independent driving (Gregersen et al., 2000), it is therefore anticipated that the Learner driver would gain more driving experience through meeting the requirements of the log-

[3] It should be noted that this paper only focuses on the changes that were made to the GDL system in Queensland that impacted on drivers with a Learner licence. A range of other changes were made that impacted on drivers with a Provisional licence.

Table 9.1 Graduated driver licensing conditions and restrictions for the former-GDL and current-GDL programs for Learner drivers in Queensland

Former-GDL program (Before 1 July 2007)	Current-GDL program (After 1 July 2007)
Learner Theory Test	***Learner Theory Test***
Learner Licence Minimum age 16 years 6 months Must be held for 6 months minimum Can accumulate 4 demerit points Zero alcohol limit if under 25 years Must display L plates Must carry licence while driving Must drive under the direction of a person who holds, and has held, an open licence for that class of vehicle for at least 1 year	**Learner Licence** Minimum age 16 years Must be held for 12 months minimum Can accumulate 4 demerit points Zero alcohol limit if under 25 years [1] Must display L plates Must carry licence while driving Must drive under the direction of a person who holds, and has held, an open licence for that class of vehicle for at least 1 year Must record 100 hours of certified supervised driving experience in a logbook, including 10 hours at night Must not use mobile phones, including hands-free/blue-tooth/loud-speaker, while driving No passengers can use mobile on loud-speaker function
Q-Safe Practical Driving Assessment	***Q-Safe Practical Driving Assessment***
Provisional Licence Minimum age 17 years	**Provisional Licence P1** Minimum age 17 years [2]

[1] New alcohol restrictions were introduced in Queensland on 1 July 2010 limiting all novice drivers to a zero BAC limit, irrespective of age. The participants in the research reported in the paper were not subject to this revised condition.
[2] Numerous changes were made to the nature of the Provisional period at the same time, however they are beyond the scope of the experiences of the Learners reported in the paper and are therefore not provided in this table.

book. It is also anticipated that the experience would include a broad range of driving situations, including more driving in both low- and high-risk circumstances.

Accordingly it appears that an implicit assumption of GDL programs such as the current-GDL program in Queensland in which hours of supervised driving practice are mandated is that more hours of supervised driving practice in a wider variety of circumstances (e.g., the compulsory 10 hours of supervised driving at night) will correspond to safer unsupervised driving following intermediate licensing.

9.3.3 Study aims

The study has two aims. Firstly, the driving and licensing experiences and

characteristics of Learners within the current-GDL program will be reported. Secondly, selected experiences and behaviours will be compared for this group with Learners who obtained their licence through the former-GDL program. Bates et al. (2009a, b, 2010b) reported the driving and licensing experiences of 149 young Queensland Learner drivers who received their licence through the former-GDL program (see Table 9.1), and these Learners comprise the comparison group. The former-GDL Learners were recruited from the North Brisbane (metropolitan) and Townsville (regional) areas of Queensland. As such, a subset of the *current*-GDL Learners who resided within these two areas was selected to compare with the former-GDL Learners surveyed by Bates et al. This comparison provided a means of examining whether the current-GDL program is having the desired effect upon Learner driver behaviour and licensing experiences.

9.4 Method

9.4.1 Current-GDL program

9.4.1.1 Participants

Learner drivers (N = 1032; 609 females, 423 males) aged 17 to 19 years (M = 17.43, SD = 0.67) volunteered to complete either a 30-minute online survey (n = 1027) or a paper (n = 5) version of the survey. The Learners had just passed their Q-Safe Practical Driving Assessment in the current-GDL program and progressed from a Learner to a Provisional driver's licence. The subsample[4] of 183 Learner drivers comprised 72 males and 111 females aged 17 to 19 years (M = 17.52, SD = 0.72). [As noted earlier, the current-GDL program began on 1 July 2007, and novices aged 16.5 years and older prior to this date undertook their driver training and licence progression under the former-GDL program. Recruitment of the current-GDL sample commenced on 1 April 2010. To ensure that all the Learners in the analyses had progressed through the current-GDL program *only*, those participants who self-reported being 19 years of age or less at the time of the study were included in the current-GDL sample.]

[4] Chi-square and t-test analyses were undertaken to compare the sociodemographic characteristics, Learner experiences, and driving behaviours for the sub-sample of current-GDL participants (n = 183) to the remainder of the current-GDL sample (n = 849). No significant differences were found for any of the comparative measures (e.g., self-reported crash involvement, χ^2 (1, N = 1002) = 0.22, p = .64).

9.4.1.2 Design and procedure

Every Learner driver in the state of Queensland, Australia who passed their Practical Driving Assessment in the months of April, May, and June 2010 was invited to complete a survey as part of a larger study exploring the attitudes and experiences of novice drivers and offered the chance to win 1 of 40 $AUD200 petrol vouchers for their participation. They were issued with a recruitment flyer advertising the research at the government Licensing Centre at the time they passed their test and a follow-up letter was also mailed to all eligible Learners. The overall response rate was 14.4 % (n = 1333, 9393 reminder letters were mailed to Learners, however only Learners aged 19 years or less are included in the present analyses). Participants completed 10 sociodemographic questions (6 similar questions featured in both the former- and current-GDL program questionnaires), collecting such information as their gender, age, and marital status. Participants responded to 18 questions regarding their GDL experiences as a Learner (14 similar questions featured in both the former- and current-GDL program questionnaires), such as difficulty obtaining practice and the accuracy of their logbook entries. They were also asked if they had been detected for a driving offence, and if they had crashed the vehicle whilst on their Learner licence. The survey was cross-sectional in design. The online survey tool was administered using KeySurvey Enterprise Online Survey Software.

9.4.2 Former-GDL program

9.4.2.1 Participants

As noted above, the former-GDL participants in this study were drawn from a sample recruited previously by Bates et al. (2009a, b, 2010b). Learners were recruited immediately after having passed their Q-Safe Practical Driving Assessment (in the former-GDL program) which had enabled them to progress from a Learner to a Provisional driver's licence. These Learner drivers (N = 149; 75 females, 74 males) were aged 17 to 19 years (M = 17.54, SD = 0.72) and completed a 35-minute telephone survey.

9.4.2.2 Design and procedure

During 2006 and early 2007, novice drivers of any age who appeared to have undertaken a Practical Driving Assessment were approached outside two major licensing centres in Brisbane (metropolitan city) and Townsville (regional town), in

Queensland, Australia. Four hundred and twenty-five novices were approached to participate in the research. Details including the person's name, gender, telephone number and suitable times to call were collected for 257 novice drivers, representing a 60.5% response rate. Novices were contacted within a few weeks and the telephone survey was administered to 219 novices, representing a 51.5% response rate overall and an 85.2% response rate for those who indicated they would participate in the research (however as noted in 9.4.1, only those novices aged 19 years or less are included in the present analyses). A cinema voucher ($AUD13) was then posted to participants as compensation for their time. The survey was cross-sectional in nature; and was designed to collect information regarding sociodemographic variables, experiences with the former-GDL program, and respondents' crash and offence history as a Learner driver. Other social and personal influences upon their driving behaviour were also collected as part of a larger research project (Bates et al., 2009a, b, 2010b).

9.4.3 Statistical analysis

Means were compared using parametric t-tests for items scored on a Likert scale, and the non-parametric Pearson Chi-square test for categorical items. Whilst experiences and behaviours measured via a Likert scale do not represent strictly interval data, for larger sample sizes these measures move toward normality. In some instances Levene's test for equality of variances indicated that variances within the two GDL program samples were not equal, therefore where appropriate the analyses report the statistics for 'equal variances not assumed' (Hair et al., 1998). Regardless, all analyses were evaluated at a significance level of $\alpha = .05$. No missing values were imputed, and cases with missing data were deleted list-wise, pair-wise, or analysis-by-analysis where relevant. Analyses were conducted using Statistical Package for the Social Sciences (SPSS) version 18.0.

9.5 Results

9.5.1 Part A: The characteristics, behaviours and experiences of current-GDL Learners

9.5.1.1 Sociodemographic characteristics

The sociodemographic characteristics of the Learners who participated in the current-GDL program survey are summarised in Table 9.2. As can be seen, the

sample comprised more females than males, and was predominantly single, studying and working full- or part-time. To gain insight into the representativeness of the current-GDL program Learner driver sample, the residential postcode of the novice was collapsed into the corresponding accessibility/ remoteness index of Australia (ARIA) code. ARIA is a categorical system based upon *geographic* accessibility to goods and services, and is also a measure of potential social interactions (Commonwealth Department of Health and Aged Care, 2001). The current-GDL novices adequately sampled all ARIA codes. To illustrate, in 2006, 60.0% of Queensland's population resided in ARIA code 1 (major cities), whilst 57.6% of the current-GDL participants reside in ARIA code 1; 21.8% of the population resided in ARIA code 2 (inner regional) and 22.4% of the participants reside in ARIA code 2; 14.9% of the state and 16.8% of the participants resided in ARIA code 3 (outer regional); 2.0% of Queensland's population and 2.2% of the participants resided in ARIA code 4 (remote); whilst 1.2% of the state's residents and 1.0% of the current-GDL participants reside in ARIA code 5 (very remote) (Australian Bureau of Statistics, 2010).

9.5.1.2 Experiences as a Learner driver

Table 9.2 also summarises the current-GDL experiences as a Learner driver. The participants held their Learner licence between 12 and 48 months. It is noteworthy that this is *not necessarily* a measure of the length of time the participants spent actively learning to drive. To illustrate, when participants were asked to indicate when they gained most of their driving experience, the majority reported they practiced 'mainly at the end'. Some participants reported driving unsupervised whilst on a Learners (which is illegal and attracts a penalty of $160 and 1 demerit point, DTMR, 2010b), and the average number of times was 16.78 (*SD* = 40.20) with a range of 1 to 250 times (80.0% of participants reported 10 or less times). Numerous reasons were provided for this rule transgression, the most common being 'only going for a quick drive', 'supervisor unavailable' and 'not a lot of traffic around'.

The average number of hours recorded in the logbook by the current-GDL Learners was 106.70 hours (*SD* = 29.01), however when only those persons required to submit a logbook were examined (41 novices with logbook exemptions were excluded), the average number of hours was 109.61 (*SD* = 25.36). The mode was 100 hours. The majority of Learners reported that their logbook entries were

Table 9.2 The sociodemographic characteristics, experiences as a Learner driver, gaining a Provisional driver's licence, and crash involvement and offence detection of novices as they progress through the Learner phase of an enhanced graduated driver licensing (GDL) program in Queensland (*n* = 1162)

Key Measure	*M (SD)* / Proportion of Learners
Sociodemographic Characteristics	
Age (Years)	17.43 (.67)
Gender(Female)	59.0%
Marital Status (Single)	97.8%
Education (Grade 12 or less)	91.5%
Study Status (Studying)	76.2%
Employment Status (Working)	69.4%
Experiences as a Learner Driver	
Learner Duration (Months)	16.17 (5.67)
When Practiced Driving	
Mainly at Beginning of Learner Period	10.9%
Throughout the Learner Period	34.6%
Mainly at End of Learner Period	54.5%
Unsupervised Driving (Novices)	10.9%
Males	14.4%
Females	8.5%
Driving Practice (Hours) [1]	109.61 (25.36)
Most Common Vehicle Practiced In	
Manual	41.4%
Automatic	37.4%
Equally Manual and Automatic	21.0%
Logbook Accuracy	
Entries Accurate	83.4%
Rounding up of Entries	12.6%
Extra Hours Included	4.0%
Parents/Friends Supervisor (Hours)	89.20 (43.85)
Mother Main Supervisor	53.5%
Males	47.7%
Females	57.6%
Instructor Main Supervisor	4.5%
Instructor Supervisor (Hours)	9.71 (11.11)
Difficulty Practising (Difficult)	22.4%
Males	17.4%
Females	26.0%
Continued Practising after Logbook Submitted [2]	94.8%
Gaining a Provisional Licence	
Gained Provisional (1st Attempt)	68.5%
Provisional Licence (Manual)	70.7%
Number of Attempts	1.38 (.72)
Learner Driver Behaviour: Crashes and Offences	
Crashes	2.5%
Offences	2.6%

[1] Please note the calculation of the mean and standard deviation of the current-GDL hours of driving practice excluded 41 novices not required to submit a logbook containing a minimum of 100 hours certified practice. Novices can apply to be exempt from completing a logbook, for example if they can demonstrate that they would be unable to document adequate driving practise within the three year maximum Learner period. If the exemption is granted they are required to hold their Learners for a two year minimum duration (Queensland Transport, 2007d).
[2] Novices are required to submit their Learner logbook at least two weeks prior to undertaking their Practical Driving Assessment. This allows the logbook to be audited for accuracy and completeness, prior to the assessment of their driving skills and abilities.

accurate. Only a handful of participants reported extra hours had been included in their logbooks. Most participants continued to practise after they submitted their logbook and were waiting to have their practical driving test, driving for an average of 11.54 extra hours (*SD* = 13.66, range = 1 - 200 hours).

Most participants reported they were supervised by their parents or friends who provided an average of 89 hours of supervision (range = 0 - 800 hours, mode = 100 hours). Mothers provided most of the supervision, followed by fathers (34.9% of Learners) as the second most common principal supervisor. When asked if someone else helped them learn to drive apart from the principal supervisor, driving instructors (33.4% of Learners) and fathers (27.7% of Learners) were reported most frequently. Professional driving instructors were heavily involved in the learn-to-drive process, with 91.1% of the current-GDL participants receiving professional instruction for an average of 10 hours (range 0 to 177 hours, mode = 10 hours). Most current-GDL Learners reported it was not difficult to obtain driving practice, with more females than males reporting difficulty. The most common reasons for this difficulty included having ‘no time to practice’, ‘can’t afford a lesson’, ‘no access to a supervisor’ and ‘no access to a vehicle’.

The current-GDL program participants reported that they had an average of 2.91 cars available to practice in, with a range of 1 to 26 cars (2 cars: 35.0%, 3 cars: 28.8%). Similar proportions of Learners predominantly used a manual or automatic vehicle to obtain their driving practice. More female novices practiced predominantly in an automatic vehicle (43.4%) than male novices (30.3%).

9.5.1.3 Gaining a provisional licence

Table 9.2 also reports the Learners’ experiences of gaining a Provisional licence in the current-GDL program. The majority of novices gained their Provisional licence on their first attempt, the remainder requiring between two (71.4%) and six (0.3%) attempts to pass. Most novices obtained a manual licence (62.4% of females, 82.6%

of males). An automatic licence was gained by 89.6% of the novices who predominantly practiced in an automatic vehicle, whilst 57.1% of those novices who predominantly practiced in a manual vehicle obtained a manual licence.

9.5.1.4 Driving behaviour: crashes and offences

Self-reported crash and offence detection are summarised in Table 9.2. Twenty-five participants reported being involved in a crash whilst on their Learner licence (1.9% of male participants, 2.9% of female participants). Twenty-six participants (4.4% of males, 1.3% of females) reported being detected for a driving offence whilst on their Learner licence.

9.5.2 Part B: Comparing the characteristics, behaviours and experiences of current-GDL Learners and former-GDL Learners

9.5.2.1 Sociodemographic characteristics

As noted earlier a subsample of the current-GDL participants, who resided in North Brisbane and Townsville, was selected to compare with the former-GDL sample recruited by Bates et al. (2009a, b, 2010b). The sociodemographic characteristics of these two participant groups, including the significance level of the differences between these samples, are summarised in Table 9.3. There was no significant difference between the two GDL program samples for the sociodemographic characteristics of age, t (330) = 0.16, p = .88, and gender, χ^2 (1, N = 332) = 2.70, p = .10. There were however significant differences between the two GDL program samples regarding their marital status, χ^2 (1, N = 332) = 11.09, $p < .01$, level of education, χ^2 (1, N = 332) = 6.51, $p < .05$, study status, χ^2 (1, N = 329) = 7.34, $p <$ .01, and employment status, χ^2 (1, N = 331) = 11.74, $p < .01$.

9.5.2.2 Experiences as a Learner driver

Table 9.3 also summarises the current-GDL and former-GDL experiences as a Learner driver, including the significance level for comparative analyses. For a range of experiences for the subset of the current-GDL participants, there was no significant difference between the two GDL program samples, including the proportion of Learners reporting driving without a supervisor (χ^2 (1, N = 327) = 3.32, p = .07). Separate gender analyses revealed however that the rate of unsupervised driving reduced considerably for male novices in particular. There were also no

Table 9.3 Summary of the former-GDL and current-GDL program measures, including comparative analyses, for novice drivers aged 17-19 years in a metropolitan and a regional area in Queensland

Key Measure	Former-GDL *N* = 149	Current-GDL *N* = 183	Sig. Level
Sociodemographic Characteristics			
Age (*M* (SD)Years) [2]	17.54 (.72)	17.52 (.72)	$p = .88$
Gender (Female) [3]	51.7%	60.7%	$p = .10$
Marital Status (Single) [3]	91.3%	98.9%	$p < .01$
Education (Grade 12 or less) [3]	97.3%	90.1%	$p < .05$
Study Status (Studying) [3]	69.2%	82.0%	$p < .01$
Employment Status (Working) [3]	89.2%	74.3%	$p < .01$
Experiences as a Learner Driver			
Learner Duration (*M* (SD) Months) [2]	12.44 (6.76)	16.52 (5.83)	$p < .001$
Unsupervised Driving (Novices) [3]	16.9%	10.1%	$p = .07$
Males	25.0%	14.7%	$p = .13$
Females	9.2%	9.2%	$p = .62$
Driving Practice (*M* (SD) Hours) [1, 2]	63.28 (48.00)	108.77 (12.67)	$p < .001$
Parents/Friends Sup. (*M* (SD) Hours) [2]	52.83 (45.80)	83.30 (25.58)	$p < .001$
Mother Main Supervisor	42.6%	50.5%	-
Males	45.8%	36.5%	-
Females	39.5%	58.9%	-
Instructor Main Supervisor	30.4%	5.1%	-
Instructor Supervisor (*M* (SD) Hours) [2]	11.49 (15.81)	9.80 (8.70)	$p = .24$
Difficulty Practising (Difficult) [2]	35.3%	23.2%	$p = .14$
Males	19.8%	14.7%	$p = .82$
Females	50.0%	28.0%	$p < .05$
Gaining a Provisional Licence			
Gained Provisional (1st attempt) [3]	61.5%	68.2%	$p = .21$
Number of Attempts [2] (*M* (SD))	1.47 (.68)	1.34 (.68)	$p = .09$
Learner Driver Behaviour: Crashes and Offences			
Crashes [3]	6.2%	1.9%	$p = .06$
Males	5.7%	5.2%	$p = .89$
Females	6.6%	0.0%	$p < .05$
Offences [3]	4.7%	0.6%	$p < .05$
Males	8.3%	0.0%	$p < .05$
Females	1.3%	1.0%	$p = .87$

[1] Please note the calculation of the mean and standard deviation of the current-GDL hours of driving practice excluded three novices not required to submit a logbook containing a minimum of 100 hours certified practice. Novices can apply to be exempt from completing a logbook, for example if they can demonstrate that they would be unable to document adequate driving practise within the three year maximum Learner period. If the exemption is granted they are required to hold their Learners for a two year minimum duration (Queensland Transport, 2007b).
[2] Analyses utilised t-tests.
[3] Analyses utilised Chi-square tests.

significant differences between the participants in the two GDL programs for the duration of professional driving instruction during the Learner period, t (309) = 1.18,

p = .24. Similarly, there was no difference in the difficulty obtaining supervised driving practice reported by participants, t (283.31) = -1.49, p = .14, notwithstanding that a greater proportion of Learners in the former-GDL program reported experiencing difficulty obtaining supervised driving practice. Separate gender analyses also found no significant difference in difficulty for male participants, t (136.61) = -0.23, p = .82; however there was a significant difference in difficulty experienced for female participants, t (138.55) = -2.26, p < .05. There were significant differences between the two GDL program samples regarding the duration of the Learner period, t (279.65) = -5.70, p < .001; the amount of supervised driving practice, t (180.88) = -10.19, p < .001; and the amount of driving practice supervised by the parents and friends of the participants, t (229.85) = -7.13, p < .001.

9.5.2.3 Gaining a Provisional licence

Table 9.3 also reports the Learners' experiences of gaining a Provisional licence in both the current- and former-GDL programs. There was no difference between the two GDL programs in the proportion of novices obtaining their Provisional driver's licence after one attempt at the practical driving assessment, χ^2 (1, N = 327) = 1.59, p = .21; nor the number of attempts needed to pass the practical driving assessment, t (313) = 1.73, p = .09.

9.5.2.4 Driving behaviour: Crashes and offences

Self-reported crash involvement and offences detected are summarised in Table 9.3. As can be seen, the difference in the proportion of Learners reporting they had been involved in a crash approached significance, χ^2 (1, N = 300) = 3.47, p = .06. None of the female participants in the current-GDL program however reported being involved in a crash, and this was a significantly smaller proportion of participants than in the former-GDL program, χ^2 (1, N = 172) = 6.51, p < .05. In general for the participants there was a significant reduction in the rate of offence detection between the two GDL programs, χ^2 (1, N = 302) = 4.87, p < .05. Separate gender analyses revealed that the proportion of *male* current-GDL participants who reported an offence was detected was significantly less compared to the former-GDL novices χ^2 (1, N = 130) = 5.07, p < .05.

9.6 Discussion

The Queensland Learner drivers progressing through the current-GDL program reported on average holding their Learner driver's licence for 4 months more than the 12 month period required. Whilst the modal logbook completion was 100 hours – the legislated minimum requirement – the average logbook included 110 hours of supervised practice, supporting the possibility raised by Bates et al. (2010b) that legislated hours may restrict the practice obtained by novices to just above the legislated requirement. While a lower average amount of practice was recorded in the former-GDL program (63 hours) the distribution of practice was bimodal, with 11.1% of Learners reporting a total amount of practice in excess of 100 hours. This suggests that the 100 hour requirement – as well as increasing the average amount of practice overall – also reduces the proportion of learner drivers who undertake longer periods of practice. Learners, their parents, and other driving supervisors should be encouraged to accrue as many hours of supervised practice in as many different driving circumstances as possible to maximise the benefits of the Learner period, even though these hours may *not* contribute to meeting their logbook requirement once the minimum 100 hours have been recorded. Licensing authorities and insurance providers may wish to consider incentives which encourage the novice to gain more driving practice – over the minimum requirement – particularly as legislating a minimum practice requirement may inadvertently send the message to parents and novices that this is the only driving practice needed to be a safe unsupervised driver (Foss, 2007)

It is noteworthy too that in the current-GDL program these hours must include a minimum of 10 hours driving at night, a particularly hazardous driving circumstance discussed earlier. A key positive indicator of the experiences of Learners within the current-GDL program is their compliance with logbook requirements. Only a small percentage of novices reported rounding logbook hours up (12.8%) or including extra hours in their logbook (4%), in contrast to media speculation that such practices were common in Queensland (Richardson, 2010) and the neighbouring Australian state New South Wales where 120 hours are required to be logged (Haynes, 2010).

The current-GDL program doubled the minimum duration of the Learner licence from 6 months to 12 months. Consequently, Learners in the current-GDL were found to hold their licence for a significantly longer period of time; however it

was not possible to determine if the participants were *actively learning to drive* for a similarly longer period of time. When Learners were asked when they actually practiced driving, only one third said 'throughout this time', whilst more than half of the participants said they practiced mainly 'at the end'. It therefore appears that the duration of the Learner period may have limited influence upon the amount of supervised hours the novice completes (Bates et al., 2010b). If it can be assumed that it is more beneficial to spread learning across the period, then Learners, their parents and their supervisors should be encouraged to start driving practice from the beginning of the 12 month period, rather than concentrating their practice just before they submit their logbook and undertake their practical driving assessment. Parents and Learners alike could be encouraged to aim for 10 hours of driving practice each month, starting from when they receive their Learner licence, to encourage supervised driving over the entire Learner period.

It is concerning that approximately 5% of the current-GDL participants did not do any driving practice in the period (of at least two weeks duration) between when they submitted their logbook and when they completed their practical driving assessment. Learners, their parents, and other driving supervisors should be encouraged to continue supervised practice in as many different driving circumstances as possible to maximise the benefits of the Learner period, even though again these hours do *not* contribute to their logbook requirement.

Importantly, compared with the former-GDL participants, a smaller proportion of Learners in the enhanced GDL program reported difficulty obtaining supervised practice, contrary to concerns raised about this difficulty (e.g., as cited in Hinchcliff et al., 2010). Female participants in the current-GDL program, in particular, reported significantly less difficulty obtaining practice. There was also a statistically significant reduction in the proportion of male participants reporting driving while unsupervised within the current-GDL. The number of times they did so and were not detected by the police may also be influential in their risky driving behaviour as the Learner period provides the foundation for independent driving behaviour. This phenomenon will be further explored in the subsequent longitudinal research.

Parents were pivotal in accruing logbook hours, with mothers in particular providing substantially more hours of driving supervision. It was apparent that there had been a shift in the responsibility for driving instruction within families, with

mothers providing considerably more supervision for their daughters and less supervision for their sons within the current-GDL program compared to the former-GDL program. Further research is required to explore the nature of this phenomenon. In addition, children not only learn from their parents through direct instruction, they are also likely to imitate the driving behaviour of their parents (Taubman-Ben-Ari et al., 2005) after they pass their practical driving test and are able to drive unsupervised. Therefore parents are pivotal influences on the driving experiences and behaviours of their children and should be encouraged to be good role models not only for their Learner child, but for their pre-licensed child. The differential influence of parents and friends on the risky behaviour of young novice drivers, including imitation of driving behaviour, will be examined within the longitudinal research utilising provisional surveys and measurement tools such as the Behaviour of Young Novice Drivers Scale (Scott-Parker et al., 2010).

Given the requirement for 100 hours supervised practice, and the fact that Learners can claim 10 hours of professional instruction as 30 hours of supervised practice in their logbooks, it is unsurprising that most of the current-GDL participants were taught by an instructor at some point during their Learner period, and that 10 hours of instruction was most commonly reported. Learners are required to record 100 hours of supervised driving practice in their logbook (it is important to note that the minimum hours of driving required of Learners reduces to only 80 hours of supervised driving practice if 10 hours of paid instruction are recorded in the logbook).

Driving behaviours are another indicator of on-road experiences of the Learner driver, and the crash and offence involvement of the Learners in the two GDL programs were examined. Rates of self-reported offence detection have reduced significantly among the current-GDL sample. It may be that offence involvement is influenced by variables such as driving and hazard perception ability, and the characteristics of the supervisor and the nature of the supervision itself, particularly for male novices. Small sample sizes may have precluded reliable analyses, however, and further exploration of the factors contributing to this outcome is required. Rates of crash involvement were also lower among the current-GDL participants, suggesting that increasing the hours of supervised practice may have broader benefits for Learner drivers in general, and female Learners in particular. Again this reduction may be attributed to the improved driving and hazard

perception skills of the novices arising from the mandated Learner supervised driving hours' requirement, even within the driving environment of significantly greater exposure to potentially risky driving circumstances. Once again, however, small sample sizes preclude definitive conclusions, and similarly further investigation of this phenomenon is also required.

Besides the small sample sizes, a range of other limitations of this research need to be addressed. The sociodemographic characteristics of the current- and former-GDL participants did not differ significantly on the key measures of age and gender. Some sociodemographic characteristics of the current-GDL sample did however differ significantly from the former-GDL sample, with the current-GDL novices more likely to be studying, single, less educated, and not engaged in employment. It is noteworthy that the differences in the sociodemographic profile of the participants may relate to the variation in the sampling methodology used between the two GDL programs. The sampling methodology of Bates et al. (2009 a, b, 2010b) was changed for the current-GDL study to obtain a larger, more diverse sample of novices which is more representative of Learner drivers in Queensland. However, methodological similarities are apparent.

It is also noteworthy that novices in the former-GDL may have experienced more difficulty recalling the number of hours of driving practice as they were not required to record their practice in a logbook, and they may have experienced difficulty in remembering the duration of their Learner period. Therefore caution should be exercised in the interpretation of the practical significance of the associated differences found between the current- and the former-GDL programs for these measures.

Further limitations include the reliance of both studies on self-report data, however anonymity supported by a telephone interview (former-GDL novices) and an online or paper survey returned by post (current-GDL novices) is likely to have minimised self-report concerns (Zhao et al., 2006). The generalisability of the findings for both GDL surveys is further limited by the representativeness of the samples. As noted earlier, the former-GDL Learners comprised only two larger licensing regions in Queensland. While the overall current-GDL sample was drawn from across the entire state, the sub-group used to compare with the former-GDL was narrower in scope to facilitate a valid comparison. Accordingly, whilst there is confidence in the outcome of the comparative analyses, these results may be

generalisable only to the regions of the state of Queensland in which the sampling, and subsequent comparison, were undertaken. As noted above, however, in an attempt to recruit a more representative sample, the entire state was sampled for the current-GDL research. The representativeness of the comparative sample, and therefore the validity of the comparative analyses, is further supported by the comparable characteristics, behaviours and experiences reported in both the entire and the subsample participants of the current-GDL Learners.

Furthermore, the entire current-GDL sample has been checked for its representativeness. Whilst the response rate for the current-GDL research was only 14.4%, this rate is consistent with other recent Australian longitudinal research (e.g., 15.9% in New South Wales, the DRIVE study, Chen et al., 2009). Notwithstanding the response rate, the sampling of the current-GDL Learners reflects the proportion of Queensland population by remoteness area (ARIA), according to the 2006 Australian Bureau of Statistics census (Australian Bureau of Statistics, 2010). To ensure that the differences in licensing experiences explored within and between the two GDL programs are unlikely to be an artefact of the changes in the licensing laws, including that some current-GDL novices may have experienced *both* GDL programs, analyses were undertaken using only those novices aged 17 to 19 years within the two GDL programs. These investigations included separate gender analyses.

Queensland Transport (2006) announced the future GDL program in 2006, advising that these changes would be implemented in 2007. Such announcements typically result in an influx of novices seeking and obtaining their Provisional licence *prior* to the introduction of the new GDL program (e.g., Masten & Hagge, 2004). Newly-licensed novices in the former-licensing program period consequently tend to be younger than typically they would be within the enhanced GDL program. Contrary to these expectations, the participants in the former-GDL program were of a similar age to the current-GDL program sample; therefore it does not appear that the former-GDL participants comprised an unduly biased sample. In addition, the enhanced GDL had been in place for nearly three years prior to current-GDL recruitment and data collection, therefore it is unlikely that the current-GDL sample experienced any rebound effects (such as reduced participation in licensing) after the more stringent GDL system was introduced.

9.7 Conclusions

The majority of Learners appear to be complying with logbook requirements, and only a small proportion of novices reported difficulty in obtaining supervised driving practice, driving unsupervised, or falsifying their logbooks. Novices gained most of their practice at the end of the Learner licence period, and the majority continued to practice driving whilst they awaited their practical driving test, although they drove for only a small number of hours. Significant differences were found between the Learner participants in the current-GDL compared to those who obtained their licence under the former-GDL program in Queensland, Australia after the enhancement of the state licensing program in July 2007. Learners in the current-GDL held their licence for a longer period of time and gained more driving practice, with mothers specifically providing most of the supervision. Female participants reported considerably less difficulty in accruing supervised driving hours and reported significantly less crash involvement, and young males in particular engaged in less unsupervised driving and reported less offence detection. Learners, their parents, and other driving supervisors should be encouraged to obtain as much supervised driving over the Learner period with as many hours as possible in excess of the logbook minimum, in particular from the beginning of the Learner period and whilst awaiting practical assessment. This supervision should include a variety of different driving circumstances.

9.8 Chapter summary

Chapter Nine comprised the fifth paper in the thesis-by-publication and is the second paper in the behaviour dimension of Bandura's RDM. The self-reported behaviour of the Learners was examined, and importantly some behaviours were compared to the behaviour of novices progressing through the former-GDL program. The findings directly inform the research conducted in the next chapter, which considers the compliance of young novice drivers with the general and GDL-specific road rules and driving restrictions. The research of Chapter Ten extends the findings of the present paper by also considering the behaviours of the young novices with a Provisional driver's licence as part of the longitudinal program of research.

Chapter Ten: Young, Inexperienced and on the Road –
Do Novice Drivers Comply with Road Rules?

10.1 Notes

Taken from:

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (in press). Young, inexperienced and on the road – Do novice drivers comply with road rules? *Transportation Research Record.*

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, arguments and hypotheses, analyzing the data, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

The journal in which this paper is in press is a peer-reviewed journal with international readership. The journal is listed in the Social Sciences Citation Index and recognised for HERDC. The 2010 Impact Factor is 0.482, and according to the Thomson Reuters Scientific Scientific Journal Citation Reports (JCR), the journal ranks 17/26 in Transportation Science and Technology journals, and is ranked 1st in total cites, 1st in the number of articles published, 2nd in the eigenfactor score, and 4th in cite half-life.

Paper Six (Chapter Ten) builds upon Paper Five (Chapter Nine) by examining the self-reported compliant *behaviour* with GDL-specific and general road rules performed by young novice drivers. High rates of compliance with GDL-specific rules by Learners was found in Paper Five, therefore Learner compliance with general road rules, and Provisional compliance with GDL-specific and general road rules is explored. In addition, the sociodemographic and GDL-Learner-specific predictors of speeding as a Provisional driver are examined. As such, the paper is pivotal in the comprehensive investigation of the self-reported risky behaviour of young novice drivers.

10.2 Abstract

The graduated driver licensing (GDL) program in Queensland, Australia, was considerably enhanced in July 2007. This paper explores the compliance of young Learner and Provisional (intermediate) drivers with current GDL requirements and general road rules. Unsupervised driving, Learner logbook accuracy, and experiences of punishment avoidance were explored, along with speeding as a Provisional driver. Participants (609 females; M = 17.43 years) self-reported sociodemographic characteristics, driving behaviours and licensing experiences as Learners. A subset of participants (238 females, 105 males) completed another survey six months later exploring their Provisional behaviours and experiences. While the majority of the participants reported compliance with both the GDL requirements and general road rules such as stopping at red lights on their Learner licence; a considerable proportion reported speeding. Furthermore, they reported becoming less compliant during the Provisional phase, particularly with speed limits. Self-reported speeding was predicted by younger age at licensure, being in a relationship, driving unsupervised, submitting inaccurate Learner logbooks, and speeding as a Learner. Enforcement and education countermeasures should focus upon curtailing noncompliance, targeting speeding in particular. Novice drivers should be encouraged to comply with all road rules, including speed limits, and safe driving behaviours should be developed and reinforced during the Learner and early Provisional periods. Novice drivers have been found to model their parents' driving, and parents are pivotal in regulating novice driving. It is vital young novice drivers and parents alike are encouraged to comply with all road rules, including GDL requirements.

10.3 Introduction

10.3.1 The young novice driver

Young drivers, who by virtue of their age and inexperience are also *novice* drivers, have been overrepresented in road crashes in motorised jurisdictions for decades (OECD, 2006). Novice drivers experience the greatest risk of being injured or killed in a road crash when they begin to drive unsupervised (Lewis-Evans, 2010; Williams, 2008). In 2008 in Queensland, Australia, 3.7% of the licensed driving population held a Learner licence and 6.3% held a Provisional (intermediate) licence. Learner drivers represented 1.5% of drivers fatally injured in road crashes, whereas 11.8% of fatally-injured drivers held a Provisional licence. Provisional drivers were also involved in 22.0% of reported road crashes (DTMR, 2010c). Novice drivers are more likely to be found at-fault in crashes (Braitman, Kirley, McCartt, & Chaudhary, 2008), and young drivers who crash or offend are more likely to crash or offend again (Elliott, Waller, Raghunathan, Shope, & Little, 2000). Variables associated with young drivers' increased crash risk include sociodemographic characteristics (e.g., age, gender) (Monarrez-Espino et al., 2006), psychological traits (e.g., sensation seeking) (Cestac et al., 2011) and states (e.g., anxiety, depression) (Scott-Parker et al., 2011a), under-developed hazard detection skills (Lee et al., 2008) and inexperience (Kirk & Stamatiadis, 2001). Risky behaviours include driving at times that are more risky for all drivers such as at night (Williams et al., 1997), using a mobile phone (Tokunaga et al., 2000), and carrying friends as passengers (Aldridge et al., 1999; Fu & Wilmot, 2008).

10.3.2 Graduated driver licensing

Graduated driver licensing (GDL) is a road safety intervention that attempts to minimise the risk of road crash while facilitating the novice gaining driving experience. The young novice initially *learns* to drive under the direction of a supervisor – hence the nomenclature of the *Learner* period. This is followed by a *Provisional* phase allowing unsupervised driving under a range of conditions. The greatest road safety benefits are associated with GDL programs that incorporate restrictions such as limited night driving whilst carrying passengers in the first period of Provisional driving (Williams et al., 2010). The GDL program in Queensland was extensively modified in July 2007. Requirements for Learner drivers include 100 hours of certified supervised driving practice (10 hours at night)

recorded in a logbook which must be submitted at least two weeks prior to completing a Practical Driving Assessment. Ten hours of driving at night must form part of this practice, and a Learner licence can be obtained at 16 years and must be held for a minimum of 12 months. Novices must be supervised by a qualified driver (parents, friends, or professional driving instructors) who has held an Open (unrestricted) car licence for at least 12 months. Key components in the current GDL program for Provisional drivers include a multistage intermediate period comprising a 12 month Provisional 1 (P1) stage during which the young novice is prohibited from carrying more than one passenger aged less than 21 years between 11:00pm and 5:00am, followed by a hazard perception test prior to progressing to the 24 month Provisional 2 (P2) licence. Plates (L, P1: red P, P2: green P) are required to be displayed on the novice vehicle. Learners, supervisors and passengers, and P1 drivers and passengers must not speak on a mobile (cell) phone, including using handsfree or loudspeaker functions. Both P1 and P2 stages incorporate vehicle power restrictions which prohibit Provisional licence holders from driving high-powered (e.g. V8 and turbo-charged cars) or modified vehicles. Full licensure (Open licence) is subsequently gained without further testing (Queensland Transport, 2007a).

10.3.3 Compliance, noncompliance and punishment

Apart from being a legal requirement, it is fundamental that novice drivers *comply* with the restrictions and requirements of Queensland's enhanced GDL program to obtain the full anticipated benefits of this intervention. A recent study (Scott-Parker, Bates et al., 2011) examined the experiences of Learners progressing through this program and found that, contrary to expectations, a small proportion of participants reported that they engaged in unsupervised driving while on their Learner licence (punishable by AUD$160 fine and one licence demerit point, DTMR, 2010b) than in the pre-July 2007 GDL program, and that most submitted accurate Learner logbooks (inaccurate logbooks can incur a six week deferment period for their PDA and a monetary fine for both novice and supervisor, DTMR, 2010b). These findings suggest that the GDL changes have not increased non-compliance among Learners, and that Learners were generally adhering to GDL-specific requirements. Young drivers are also required to comply with general road rules (e.g., obeying traffic signals) which apply to *all* drivers, irrespective of licence type. The majority of the Queensland Learners reported complying with general road

rules such as wearing seatbelts in the former GDL program (Bates et al., 2009a). The compliance of novice drivers progressing through an enhanced GDL program with general road rules has not been explored, nor have the factors influencing non-compliant driving behaviour been investigated. Non-compliance with speed limits is arguably the most widespread illegal behaviour for drivers in general, and novices in particular, therefore contributors to speeding need to be identified.

Non-compliance with GDL-specific requirements is potentially risky for novice drivers and road users alike and undermines the integrity of the licensing and general road rule systems. In addition to parental monitoring and enforcement of the GDL requirements, active Police enforcement plays a role in ensuring the effectiveness of the licensing program and facilitating safe driving. In Queensland, as is the case in other jurisdictions, the requirement for Learner and Provisional drivers to display "L" and "P" plates assists the Police to enforce the GDL requirements. Nonetheless, there are a variety of ways the novice driver can potentially avoid punishment for non-compliance, such as 'talking themselves out of' receiving any formal fine when pulled over by Police, and the novice's parents 'taking the punishment' by paying the monetary fine and/or incurring the demerit points for the offence (e.g., speeding detected via a road-side camera). Furthermore, it appears normative for young drivers to pay attention to Police presence on the road, however some novice drivers consider themselves to be 'smarter' (i.e., non-compliant) drivers than others by deliberately avoiding actual and anticipated Police presence (Scott-Parker et al., 2012a). Irrespective of attempts at punishment avoidance, Police are unable to detect every rule transgression. Therefore licensing programs like the GDL in Queensland require considerable acceptance of the conditions by parents and novice drivers (Waller et al., 2000) in addition to acceptance of and compliance with the general road rules. A majority of parents and their novice children support GDL interventions; however, compliance becomes problematic if either one or both of these do not endorse GDL requirements (Foss & Goodwin, 2003; Goodwin et al., 2006; Williams et al., 2002). Recent research framed within Akers' social learning theory and deterrence theory has confirmed that the experience of punishment avoidance is a strong predictor of non-compliance, particularly speeding (Fleiter & Watson, 2005).

10.3.4 Study aims

This study investigated the compliance of young novice drivers in Queensland with both GDL-specific requirements and general road rules. Determining the amount of compliance with GDL requirement is necessary because the changes to Queensland's GDL program were made with the expectation that novices – and their parents – would comply with both GDL-specific (such as only driving whilst supervised) and general driving requirements (such as obeying speed limits). Self-reported offence and crash involvement, and the incidence of novices experiencing punishment avoidance, in particular the novice' parents 'taking' the punishment by incurring the demerit points and paying the fine, were explored. Furthermore, it is vital that the sociodemographic and licensing determinants of non-compliant behaviour be identified to ensure the current GDL program is not inadvertently contributing to noncompliance, including unsupervised driving and the falsification of logbooks, among some novices. In the current study the sociodemographic and GDL predictors of self-reported noncompliance with posted speed limits as a Provisional driver were examined.

10.4 Method

10.4.1 Participants

Young novice drivers (n = 1032, 609 women) aged 17-19 years (M = 17.43, SD = .67) volunteered to complete the 30-minute Learner Survey ("Learner drivers"). These drivers had just passed their Q-Safe Practical Driving Assessment and progressed from a Learner to a Provisional (intermediate) (P1) driver's licence at the time of recruitment. Six months later, 343 of these novice drivers (238 females) now aged 17 to 20 years (M = 17.76, SD = 0.84) completed the 30-minute Provisional Survey ("Provisional drivers"). Only Learners aged 19 years or younger (therefore Provisional drivers aged 20 years or younger) were included in the present research to ensure that they would have experienced the current GDL program only.

10.4.2 Design and procedure

Every Learner driver in Queensland who passed their Practical Driving Assessment in the period April through June 2010 was invited to participate in a longitudinal research project exploring the behaviours of novice drivers. Flyers detailing the survey hyperlink were issued with their Provisional licence. Surveys

were anonymously completed online, and participants provided email addresses for the second survey. One reminder letter was mailed to all 9393 eligible novices. The overall response rate for Survey 1 was 14.4% (n = 1333 drivers aged 17-38 years). The Learner Survey response rate specifically applying to novices aged 17-19 years could not be calculated because the ages of those novices who did not participate could not be determined due to Privacy restrictions. The Provisional Survey hyperlink was emailed to the Learner participants six months later. Two reminders were issued. The attrition rate between the Learner and Provisional Surveys was 65.6%. Incentives for participation included the chance to win petrol vouchers and/or movie tickets for each survey.

10.4.3 Materials

Novices completed nine sociodemographic questions including their gender and their age in each survey. Residential postcode was used to determine their accessibility/remoteness index of Australia (ARIA) code. ARIA is a national categorical system based upon geographic accessibility to goods and services and is also a measure of potential social interactions (Commonwealth Department of Health and Aged Care, 2001). The novices adequately represented all ARIA codes. For example, in 2006, 60.0% of Queensland's population resided in ARIA code 1 (major cities), whilst 57.6% of the participants in the Learner Survey and 61.8% of the participants in the Provisional survey resided in ARIA code 1. Participants were coded as living in an urban (ARIA 1) or rural (ARIA 2-5) area.

Participants self-reported their experiences with Queensland's current GDL program in the Learner Survey. Items included duration of Learner licence, difficulty obtaining supervised practice, if they drove on the road unsupervised (*yes, no*), and Learner logbook accuracy (*accurate logbook*, *rounding of hours or extra hours included)*. Participants reported if they had crashed the car and been detected for a driving offence (*yes*, *no*), and completed the Behaviour of Young Novice Drivers Scale (BYNDS), a 44-item instrument that measures the frequency of novice driver risky behaviours on a scale of 1 (*never*) to 5 (*nearly all the time*) (Scott-Parker et al., 2010) in both surveys. Nineteen BYNDS items measure illegal behaviour; six of these items comprise a speeding subscale (Learner α = .78, Provisional α = .87) capturing the frequency and context in which speeding occurs. Participants reported whether their parents had 'taken the punishment' on their behalf in both surveys (*yes*,

no). Car ownership and driving exposure (distance, duration, and consistency) was self-reported in the Provisional Survey. The online survey tool was administered using KeySurvey Enterprise Online Survey Software.

10.4.4 Statistical analysis

Means were compared using analysis of variance (ANOVA), the non-parametric Wilcoxon signed-rank tests, including matched pair analyses, were used for the non-normally distributed Likert scale data and the Pearson chi-square test was used for categorical items. Measures of internal consistency utilised Cronbach's alpha (α). The minimum hierarchical multiple regression (HMR) sample size of $n \geq 50 + 8m$ (where m = the number of independent variables) (Tabachnick & Fidell, 1996) required for a preferred power of 80%, and to detect a medium effect size of .20, was met. All analyses were evaluated at a significance level of $\alpha = .05$. Missing data was not imputed. Analyses were conducted using PASW version 18.0.

10.5 Results

10.5.1 Sample characteristics

10.5.1.1 Learner drivers

Learner drivers were predominantly single (68.7%), educated at the secondary (senior) level or higher (64.1%), studying full-time (71.8%), and working part-time (69.0%). Approximately 10% of novices were born overseas, and 5.3% did not speak English as their main language at home.

10.5.1.2 Provisional drivers

Provisional drivers were predominantly single (66.2%), educated at the secondary level or higher (94.2%), studying full-time (53.9%), and working part-time (61.4%).

10.5.1.3 Comparison: Learner and provisional drivers

A comparison of the sociodemographic characteristics of the 689 novices who did not complete the Provisional Survey with the 343 who did revealed that those who participated in both Surveys were significantly more likely to be female and studying ($p < .001$).

10.5.2 Compliance with GDL-specific restrictions

10.5.2.1 Learner drivers

To confirm the night driving requirement was met, the responses to the BYNDS item "You drove at night" were examined. A very small proportion of novices (1.3%) reported that they never drove at night. All Learners are required to be supervised by a suitably qualified person whenever they drive. Driving unsupervised was reported by 113 Learners (10.9%), who did so between 1 and 250 times during the Learner period (86.9% reported between 1 and 20 times). Nearly 8% of Learners reported they occasionally or sometimes drove without a supervisor, whilst 3.6% of Learners reported they usually or always drove without a supervisor. As noted earlier, Learner drivers are required to summarise the supervised driving practice they obtain during the period in a logbook. The majority of novices reported that overall their logbook entries were 'correct' (n = 832), whilst 12.6% reported that their entries were 'rounded' and 40 (4.0%) reported having extra hours included in their logbooks.

Participants who reported engaging in unsupervised driving while on their Learner's Licence were significantly more likely: to be male (14.7% of males, vs 8.5% of females drove unsupervised) and in a relationship (14.2%, vs 9.6% no relationship); to have submitted inaccurate logbooks (21.7% vs 9.0% accurate); to have engaged in pre-Licence driving (PLD) prior to obtaining their Learner Licence (23.2% vs 9.4% no PLD); and to have been detected for a driving offence (40.0% vs 10.4% no offence), report their parent 'took the fine' for an offence (37.5% vs 11.0% no parent took fine), avoided the Police (23.2% vs 8.4% no avoidance), and sped as a Learner (M = 11.63 vs M = 8.71 no unsupervised driving). Unsupervised driving was significantly less likely if lessons were undertaken throughout the Learner period (7.8% vs 16.1% mainly at start, 12.1% mainly at end).

Participants who reported that their Learner logbook entries were not wholly accurate were significantly more likely to be older (24.5% of drivers aged 19 vs 13.8% of drivers aged 17 years submitted inaccurate logbooks), more educated (19.3% of Grade 12/tertiary vs 11.9% of Grade 10), to speak a language other than English at home (32.1% vs 15.8% of English-speaking homes), and to have experienced difficulty obtaining supervised driving lessons (21.8% of 'difficult' vs 12.9% of 'easy'), to have had access to two or fewer cars (19.3% vs 14.4% > 2 cars), recorded 100-110 hours in their logbook (18.0% vs 11.7% > 110 hours), held their Learner's for a longer duration (22.4% > 24 months vs 13.1% 12-14 months), driven

whilst unsupervised (32.4% vs 14.7% no unsupervised driving), been involved in a crash as a Learner (32.0% vs 16.3% no crash), avoided Police (26.5% vs 14.3% no avoidance), and sped as a Learner (M = 10.02 vs M = 8.71 logbook accurate).

10.5.2.2 Provisional drivers

In contravention of the GDL requirement, 25.0% of Provisional drivers reported they occasionally or sometimes carried two or more passengers after 11 pm, and 1.2% reported they usually or always did. Most participants (93.3%) reported they always complied with high-powered vehicle restrictions.

10.5.3 Compliance with general road rules

10.5.3.1 Learner drivers

All persons in Queensland are prohibited from driving on the road unless they have a valid driver's licence. A total of 125 (12.1%) of the participants reported they drove on the road before they had a valid Learner's licence (pre-Licence driving) with a range of 1 to 150 times (75% reported 20 or fewer times). Table 10.1 summarises the participants' responses as both Learner and Provisional drivers to the BYNDS items of interest for the present paper.

The majority of Learners complied with general road rules including not driving whilst intoxicated. A small proportion of Learners reported not indicating when changing lanes and performing illegal U-turns. A considerable proportion of Learners reported exceeding posted speed limits; nearly 70% sped by up to 10 km/hr at least occasionally, 33.3% sped by 10-20 km/hr and when it was unlikely there was any detection device (speed camera, police radar) in the vicinity. Disturbingly, 12% of Learners reported speeding by at least 20 km/hr.

Learner compliance with general road rules was also examined in terms of reported compliance with supervised driving and logbook requirements. Learners who reported submitting an inaccurate logbook differed significantly from Learners who only recorded accurate entries by more frequently using a handheld mobile (p = .04), performing illegal U-turns (p = .02), driving unlicensed (p = .02), speeding by up to 10 km/hr (p < .001), and speeding in an area where detection was unlikely (p = .02). Learners who reported driving unsupervised differed significantly from Learners who did not on every item displayed in Table 10.1, except for wearing a seatbelt on a short trip (p = .26).

Table 10.1 Percentage of participants self-reporting their compliance with general road rules and GDL restrictions as Learner (n = 1032) and Provisional (n = 343) drivers

Non-compliant Behaviour (BYNDS)	Never	Occasionally/ Sometimes	Usually/ Always
You drove when you thought you may have been over the legal alcohol limit [c]			
Learner	**96.7**	**3.3**	**0.0**
Provisional	**87.8**	**11.6**	**0.6**
You drove after taking an illicit drug such as marijuana or ecstasy			
Learner	99.1	0.7	0.2
Provisional	97.4	2.6	0.0
You spoke on a mobile that you held in your hands [c]			
Learner	**95.2**	**4.6**	**0.2**
Provisional	**72.6**	**24.5**	**2.9**
You did an illegal U-turn [c]			
Learner	**83.0**	**16.6**	**0.4**
Provisional	**73.1**	**25.1**	**1.8**
You didn't always indicate when you were changing lanes [c]			
Learner	**78.8**	**20.6**	**0.6**
Provisional	**74.3**	**23.1**	**2.6**
If there was no red light camera, you drove through intersections on a red light [b]			
Learner	**99.0**	**1.0**	**0.0**
Provisional	**96.1**	**3.1**	**0.8**
You drove over the speed limit in areas where it was unlikely there was a radar or a speed camera [c ,d]			
Learner	**63.2**	**34.7**	**2.1**
Provisional	**41.6**	**51.0**	**7.4**
You went up to 10 km/hr over the speed limit (eg 65 in a 60, 105 in a 100) [c, d]			
Learner	**30.7**	**63.5**	**5.8**
Provisional	**19.8**	**67.6**	**12.6**
You went 10-20 km/hr over the speed limit (eg 72 in a 60, 112 in a 100) [c, d]			
Learner	**68.1**	**30.5**	**1.4**
Provisional	**49.8**	**45.2**	**5.0**
You went more than 20km/hr over the speed limit (eg 60 in a 40, 100 in an 80) [c, d]			
Learner	**87.5**	**11.9**	**0.6**
Provisional	**76.7**	**21.8**	**1.5**
You deliberately sped when overtaking [c, d]			
Learner	**48.7**	**44.2**	**7.1**
Provisional	**39.4**	**49.8**	**10.8**
You sped at night on roads that were not well lit [c, d]			
Learner	**85.1**	**14.2**	**0.7**
Provisional	**70.8**	**28.6**	**0.6**
You didn't wear a seatbelt if it was only for a short trip [a]			
Learner	**98.8**	**1.1**	**0.1**
Provisional	**95.9**	**3.8**	**0.3**
You didn't always wear your seatbelt [a]			
Learner	**98.7**	**1.3**	**0.0**
Provisional	**97.4**	**1.7**	**0.9**

Table 10.1 (Continued)

Non-compliant Behaviour (BYNDS)	Never	Occasionally/ Sometimes	Usually/ Always
Your passengers didn't wear seatbelts			
Learner	98.1	1.3	0.6
Provisional	97.3	2.1	0.6
You carried more passengers than there were seatbelts in your car [b]			
Learner	**98.1**	**1.3**	**0.6**
Provisional	**95.9**	**3.8**	**0.3**
You carried more passengers than could legally fit in your car [c]			
Learner	**98.6**	**1.4**	**0.0**
Provisional	**93.8**	**5.9**	**0.3**

Note: Although the participants' responses are separated in the Table according to three categories, the statistical comparison of their Learner and Provisional behaviour was undertaken on the ungrouped Likert scale data using a matched Wilcoxon signed rank test for the drivers who completed both surveys only. Significant differences between Learner and Provisional behaviours are bolded for ease of reference. [a] $p < .05$, [b] $p < .01$, [c] $p < .001$, [d] BYNDS items used to create the Speeding subscale.

10.5.3.2 Provisional drivers

The majority of Provisional drivers indicated they complied with road rules including not carrying more passengers than could fit in their car (Table 10.1). One quarter reported they occasionally or sometimes used a hand-held mobile. Provisional drivers also reported considerable non-compliance with posted speed limits; half the drivers reporting they sped by 10-20 km/hr and one quarter speeding by 20 km/hr or more.

10.5.3.3 Comparison: Learner and provisional drivers

In general novice drivers become less compliant, and more risky, drivers as they progressed through these GDL stages (Table 10.1). Overall, novices reported they drove while they were under the influence of alcohol, spoke on a hand-held mobile, performed illegal U-turns, did not indicate when they changed lanes, drove through intersections on a red light, exceeded speed limits by various amounts under numerous conditions, and carried passengers in contravention to vehicle capacity significantly more frequently as Provisional drivers than when they were Learner drivers.

10.5.4 Crash and offence involvement

10.5.4.1 Learner drivers

Twenty-five participants (2.5%) reported they had been involved in 1 (88.2%) or 2

car crashes while on their Learner licence. Two thirds of drivers involved in a crash were female, 56.0% were aged 17 years, 12.0% had driven unsupervised as a Learner, and 16.0% reported pre-Licence driving. Twenty-six participants (2.6%) reported they had been detected for between 1 (80.0%) and 3 driving offences while on their Learner licence, with a total of 37 offences reported. Two thirds of offenders were male, 48.0% were aged 17 years, 40.0% had driven unsupervised as a Learner, and 32.0% reported pre-Licence driving.

10.5.4.2 Provisional drivers

Thirty-five Provisional drivers (10.3%) reported they had been involved in between 1 (80.0%) and 3 car crashes (10.6% of males, 10.2% of females) while driving on their Provisional licence. Nearly half were aged 17 years (45.7%), 85.7% were employed, 48.5% engaged in unsupervised driving as a Learner, and 14.3% reported pre-Licence driving. Forty-three Provisional drivers (12.6%) reported they had been detected for a driving offence (18.1% of males, 10.1% of females). Nearly half of offenders were aged 17 years (46.5%), 81.4% were employed, 28.0% reported unsupervised driving as a Learner, and 16.3% reported pre-Licence driving.

10.5.4.3 Comparison: Learner and provisional drivers

There appeared to be a relationship between the crashes and offences of the Learner and their subsequent Provisional driving behaviours. Half of participants who reported committing an offence while a Learner also reported committing an offence as a Provisional driver. One quarter of the Learners who reported being involved in a crash also reported committing an offence as a Provisional driver. Nearly 30% of Provisional drivers who reported being involved in a crash also reported committing an offence as a Provisional driver.

10.5.5 Punishment avoidance

10.5.5.1 Learner drivers

Eight Learners (0.8%) (3 males; 7 aged 17 years) reported their parents had ‘taken their punishment’ for road-rule transgression on one occasion only.

10.5.5.2 Provisional drivers

Nine Provisional drivers (2.7%; 5 males) reported their parents had ‘taken their

punishment' for them between one (55.5%) and three times.

10.5.5.3 Comparison: Learner and provisional drivers

There was a relationship between punishment avoidance, crashes and offences of the Learner and their subsequent Provisional driving behaviours. Nearly 45% of Provisional drivers who reported their parent had taken their punishment when they were a Provisional driver reported they had also been detected for an offence as a Provisional driver ($p < .05$). One-way ANOVA's were conducted to examine differences in the self-reported speeding behaviour for Provisional drivers for committing an offence, crash involvement, Police avoidance, and parents taking their punishment, using a speeding subscale developed by summing the relevant items in Table 10.1. Speeding subscale scores were significantly higher ($p < .001$) for Provisional drivers who reported an offence had been detected and that they avoided the Police as a Provisional driver.

10.5.6 Predicting noncompliance

10.5.6.1 Provisional drivers: Speeding

The speeding subscale for the Provisional drivers had a mean of 9.03 (SD = 3.07, Range 6-25, Median = 8). Prior to regression analyses, some sociodemographic variables were recoded to form dichotomous variables: relationship status (1 *not in a relationship*, 2 *in a relationship*), education (1 *less than secondary*, 2 *secondary or higher*), study status (1 *full or part time*, 2 *not studying*), and employment status (1 *full or part time*, 2 *not working*). A number of GDL variables were also dichotomised: number of cars available to practice in (1 *one or two cars*, 2 > *2 cars*), duration of Learner period (1 ≤ *14 months*, 2 > *14 months*), and number of hours recorded in the logbook (1 ≤ *110 hours*, 2 > *110 hours*).

A HMR was conducted to investigate the influence of sociodemographics (step 1) and Learner GDL variables (step 2) on self-reported speeding while on a Provisional licence. The overall model was significant, and explained 42.1% of variance in self-reported Provisional speeding (Table 10.2). Step 1 explained a significant 9.1% of variance. Step 2 explained an additional 33.0% of variance. At the final step, significant predictors were age (younger), relationship status (in a relationship), driving unsupervised as a Learner, submitting an inaccurate logbook, and speeding as a Learner. Prior behaviour was the strongest predictor of current

behaviour – Learner speeding uniquely explained 17.8% of variance in Provisional drivers' speeding.

Table 10.2 Hierarchical Multiple Regression Results for Sociodemographic Variables and Graduated Driver Licensing Variables in Self-Reported Speeding During the First Six Months of Independent Driving

Variable	*B*	*SE*	β	sr^2	R^2	*Adj* R^2	ΔR^2
Step 1							
Gender	.02	.42	.00				
Age	**-.86**	**.32**	**-.17** [b]	**.014**			
Australian Born	.29	.72	.02				
English Language	1.30	1.01	.06				
Relationship Status	**1.11**	**.42**	**.12** [b]	**.014**			
Study Status	.28	.39	.03				
Employment Status	-.13	.45	-.04				
Education	.34	.56	.03				
ARIA	-.16	.24	-.03				
					.127	**.091** [c]	**.127** [c]
Step 2							
Pre-Licence Driving	1.14	.61	.09				
Drove Unsupervised	**1.86**	**.72**	**.13**[a]	**.013**			
Parent/Friend Supervised	-.88	1.56	-.03				
Instructor Supervised	.49	.70	.03				
Difficulty Practicing	-.26	.19	-.07				
Logbook Hours	-.01	.01	-.05				
Learner Duration	.03	.05	.04				
Logbook Inaccuracy	**1.70**	**.53**	**.15** [b]	**.020**			
Own Car	-.55	.54	-.05				
Exposure (km)	.00	.00	.03				
Exposure (hrs)	.02	.02	.05				
Learner Speeding Scale	**.68**	**.07**	**.48** [c]	**.178**			
					.461	**.421** [c]	**.334** [c, d]

Note: [a] $p < .05$, [b] $p < .01$, [c] $p < .001$. All results are at the final stage. Significant predictors of self-reported speeding of young Provisional drivers are bolded for ease of reference. F (21,281) = 11.46, $p < .001$.

10.6 Discussion

10.6.1 Practical implications

Most Learners reported complying with the general road rules that *all* drivers must obey, such as not driving whilst intoxicated, and with GDL-specific requirements such as Learner driving at night. While there is no clear evidence

regarding this matter, it is arguable that the requirement to display novice plates may both encourage compliance with the requirements and assist the police to identify noncompliant novices. Future research could compare differences in detection rates for non-compliance across different jurisdictions that do and do not require the display of novice plates. Most Learners also reported they had not avoided punishment by their parents taking their punishment. It is concerning, however, that 70% of Learners reported they had exceeded the posted speed limit, and that 12.5% of Learners reported they had exceeded the speed limit by at least 20 km/hr at least once. Speeding is not only risky and associated with crashes as a Learner; it may possibly reflect risky attitudes towards driving behaviour held by both the Learner and the supervisor, and potentially inadequate supervision of the Learner which was most commonly provided by the Learners' mother and father in this study (Scott-Parker, Bates et al., 2011). The characteristics of the supervisor when the Learner does not comply with the general road rules should be examined, including reasons for not punishing/ facilitating punishment avoidance of both Learner and Provisional non-compliant behaviour. In addition, and unsurprisingly, most novices reported less compliance with rules as a Provisional driver. Learners must drive under supervision, therefore the lack of supervision and associated opportunities for noncompliance during the intermediate period are likely to contribute to such behaviour.

Speeding reported during the supervised Learner period merits further consideration, and may be indicative of the influence of parental attitudes and role modeling relating to this behaviour. Educational interventions should target both the Learner and their parents and highlight the risk associated with being a novice driver as well as exceeding posted speed limits, and also the increased combined risk with being a novice driver who speeds. The Learner phase is designed to allow the novice to establish safe driving behaviours and attitudes. Such risky, illegal behaviour appears to result in considerably more speeding in the subsequent unsupervised intermediate driver, placing the novice at greater risk of injury or fatality from a road crash. Overall, the more experienced a driver became the more risky driving they reported engaging in, evidenced not only as self-reported non-compliance but also in terms of reported offences and crashes.

Furthermore, whilst the majority of novices reported complying with the conditions in Queensland's current GDL program, there was a considerable

proportion of novices who did not. Twelve percent of Learners reported pre-Licence driving – a very risky and illegal behaviour– and these drivers were significantly more likely to drive unsupervised as a Learner. The nature of the journey including the presence of and relationship to passengers(s) during pre-Licence and unsupervised driving needs to be explored. Unsupervised driving may be predicted by parent availability, that is, unsupervised driving may be more likely to occur when parent(s) are not home and a vehicle is available to be driven. Identification of these predictors will assist with the development of targeted interventions.

Whilst a minority of novices reported driving without a supervisor and submitting inaccurate logbooks, a number of sociodemographic, GDL, and behavioural variables were associated with these illegal behaviours. Driving unsupervised – another risky and illegal behaviour – was associated with Learner logbook inaccuracy. Logbook inaccuracy – also an illegal behaviour– was associated with driving unsupervised. Future research should explore other variables that influence unsupervised driving and logbook inaccuracy by the Learner. Whilst the majority of novices who are Learners are typically younger, the experiences and behaviours of older novices should also be examined. This would allow the development and implementation of interventions that target the sociodemographic characteristics and GDL variables that appear to contribute to non-compliance with GDL-specific and general road rules. Other GDL programs could be examined to identify potential contributors to non-compliance (such as driving speed restrictions, late night curfews), and to assist with the development of targeted interventions.

Unsupervised Learners and those who submitted inaccurate logbooks were significantly more likely to report speeding when they became an intermediate driver, and these behaviours are indicative of general non-compliance. In addition, speeding as a Learner was a considerable predictor of speeding as a Provisional driver. Drivers who were younger at provisional licensure were also more likely to report speeding. It is again noteworthy that parents play a pivotal role in their child's driving, and the Learner period should provide a foundation for novice drivers to develop safe driving attitudes and habits. Parents frequently own the car driven by the Learner, and they provide most of the driving supervision of the Learner (Scott-Parker, Bates et al., 2011). They are also in a unique position to not only punish risky driving behaviour that is performed whilst they are supervising (such as deliberate speeding) (Scott-Parker et al., in press), but they can monitor car use

before (Scott-Parker et al., 2012b) and *after* the novice obtains their Learner and Provisional licences (Scott-Parker et al., in press). Interventions targeting parents of young drivers should highlight the nature and the extent of parents' influence on novice driver's behaviour – at pre-Licence, Learner and Provisional stages alike – and the importance of monitoring their child's car use at all stages.

Learners who did not speak English as the main language at home reported more logbook inaccuracy. This suggests that licensing resources provided for people from non-English speaking backgrounds should incorporate an additional education component which highlights that *accurate* recording of 100 hours of supervised driving practice is compulsory and detail the fine for transgressions of this rule and the greater risks of road crash and potential injury associated with not obtaining the mandatory driving practice in the Learner period.

The novice themselves also play a key role in GDL and general road rule compliance, including choosing to only drive whilst supervised, and should be encouraged to comply with *all* road rules, irrespective of licence type. In addition, there are broader road safety implications if the young person drives before they have a Learner driver's licence, drives unsupervised, deliberately records inaccurate logbook entries and speeds as a Learner, particularly as risky driving by the Learner was associated with crash and offence involvement as a Learner and Provisional driver. There was also a relationship between punishment avoidance and Provisional crashes and offences. Of concern is that a lack of punishment has actually been found in previous research to be rewarding to novice drivers, increasing the likelihood risky behaviour is repeated (Fleiter & Watson, 2005; Scott-Parker et al., 2012a).

Parents were involved in punishment avoidance by the novice, with a small percentage incurring punishment that should have been experienced by their child. Interventions targeting parents of young novice drivers should encourage them not to facilitate their child's punishment avoidance for road rule transgressions. Parents are uniquely positioned to encourage compliance with GDL and general road rules (Williams et al., 2006). Intervention programs utilising press releases, brochures and posters at schools and licensing centres have been found to result in moderate reductions in parents' allowing their children to be GDL non-compliant (Goodwin et al., 2006). General police enforcement programs have been found to improve compliance (e.g., with speed limits, Walter et al., 2011), however other studies have

found that noncompliant behaviour resumes outside the vicinity of the police enforcement activity (Sisiopiku & Patel, 1999).

Furthermore, research has indicated that leniency by Police is common (Schafer & Mastrofski, 2005). Young novice drivers report they have readily talked themselves out of a ticket, and on more than one occasion (Scott-Parker et al., 2012a). However, the role of differential Police enforcement in young driver compliance is not fully understood (Foss & Goodwin, 2003). Given that young drivers tend to carry their friends as passengers, social punishment may also prove effective in improving compliance (Fleiter et al., 2010). Rewards for compliance (Greaves & Fifer, 2010) may prove effective, and technology such as seatbelt reminder systems (Young et al., 2008) and real-time feedback (Musicant & Lampel, 2010) have been found to reduce risky behaviours. Improving compliance with GDL and road rules is essential if young novice drivers in particular, and all road users in general, are to benefit from these conditions (Williams, 2011).

10.6.2 Strengths and limitations

The research has a number of strengths, including a diverse state-wide sample that was representative of Queensland's ARIA profile. Furthermore, the role of sociodemographic and GDL variables in the experiences of Learners and Provisional drivers has not been examined previously, or within the context of Queensland's current GDL program. However, the limitations need to be borne in mind when interpreting the results. The overall response rate was low, and a greater proportion of Learners aged 17 years chose to participate (66.3% of the participants compared to 49.8% of Queensland's Learner population). The greater participation by females (notwithstanding that 52.0% of Queensland Learners were female) may also moderate the nature and extent of compliance, as young males typically engage in more risky and noncompliant behaviour. Also, substantial attrition occurred throughout the project, potentially due to 99% of Queensland being declared a natural disaster area due to flooding during the follow-up study period (AAP, 2011). Data were collected via self-report, and it is acknowledged that some drivers, having just received their licence, may have been apprehensive about reporting on their lack of compliance with road rules and GDL requirements or the performance of illegal behaviours. However, the anonymous nature of the survey and the absence of punitive consequences hopefully ameliorated such concerns and biases including

impression management and underreporting of illegal activity. The self-report data provided rich information regarding compliance with road rules, GDL requirements, and illegal behaviours, particularly given that many of these noncompliant behaviours would not have been detected or punished. Therefore, the study provides information that would not have been available from other sources including Police and government licensing authorities.

10.7 Conclusion

The majority of young novice drivers in Queensland, Australia surveyed in this study reported complying with both GDL-specific requirements and general road rules. Unsurprisingly, compliance with GDL requirements and general road rules decreases upon intermediate licensure, when the young novice is able to drive independently. Speeding should be particularly targeted among this group because speed limits were the rules least frequently complied with and the behaviour has been found to be risky for the inexperienced young novice driver. However, it is important to note that speeding is not a problem unique to novice drivers in Australia. In addition, there appears to be a small proportion of Learners for whom general noncompliance is higher, suggesting interventions could be tailored for these novices. Early and greater involvement of parents in conjunction with law enforcement may be beneficial, targeting adolescents both before they become licensed and after they obtain their Learners and Provisional licences. These interventions should encourage compliance with both GDL-specific requirements and general road rules, fostering the development and maintenance of non-risky road use attitudes and behaviours in the novice driver.

10.8 Chapter Summary

Chapter Ten explored the self-reported compliance of young drivers with Queensland's GDL-specific and general road rules. In addition, a range of predictors of P1 speeding were examined. The next paper, Chapter Eleven, focuses upon the self-reported risky and illegal behaviour of pre-Licence driving, in which the young person drives on the road before they obtain a valid Learner licence, and which had been identified in Chapters Nine and Ten.

Chapter Eleven: Young and Unlicensed: Risky Driving Before Entering the Licensing System

11.1 Notes

Taken from:

Scott-Parker, B., Bates, L., Watson, B., King, M. J., & Hyde, M. K. (2011). Young and unlicensed: Risky driving before entering the licensing system. *Traffic Injury Prevention, 13*(3), 213-218. doi*:* 10.1080/15389588.2011.638683

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, arguments and hypotheses, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online survey and the analysis of the data collected. The second, third, and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

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This paper, Chapter Eleven, further examines the self-reported non-compliant *behaviour* of the young novice driver. Speficially, the focus is upon pre-Licence driving, in which the young person drives on the road even before they obtain a Learner driver's licence.

11.2 Abstract

Objective: On-road driving before gaining a valid licence (pre-Licence driving) represents a risk for all road users. Pre-Licence driving among young people who obtained a Provisional licence within an enhanced graduated driver licensing program in Queensland, Australia, was investigated.

Methods: Recently-licensed drivers (n = 1032) aged 17-19 years (M = 17.54) completed a survey exploring their driving experiences while on their Learners licence. Six months later, 355 of these drivers completed the same survey exploring their experiences on their Provisional (intermediate) licence.

Results: Twelve percent of participants reported pre-Licence driving. Pre-Licence drivers reported significantly more risky driving as Learners and Provisional drivers.

Conclusions: Pre-Licence drivers not only place themselves and other road users at risk at the time but also continue to do so through their subsequent risky driving. Pre-licence driving should be discouraged, and parents should be encouraged to monitor car use and the driving behaviour of their children.

11.3 Introduction

Road crash statistics consistently reveal that young drivers are overrepresented in both fatalities and injuries not only in Australia but in motorised countries around the world. Interventions such as graduated driver licensing (GDL) programs have been implemented to reduce the risks experienced by young novice drivers as they become more practised not only in the driving task itself but also the development of hazard recognition skills. It is noteworthy that evaluations suggest GDL are effective, the Learner period remains a safe period for the novice whilst the Provisional (intermediate) period is associated with the greatest risk to the developing driver (Williams et al., 2010).

Young novices who drive outside of the licensing system as unlicensed drivers are at greater risk of crash, injury and fatality (Lam, 2003a; Watson & Steinhardt, 2006). Drivers who have never been licensed experience more than five times the risk of being involved in a serious crash than licensed drivers (Watson, 2004b) and nearly five times the risk of being involved in a fatal crash (De Young, Peck & Helander, 1997). The unlicensed driving population includes drivers who will never obtain a licence, drivers who are unlicensed due to licence expiration, suspension and cancellation, and young people who drive on the road *prior* to entering the licensing system (pre-Licence driving). Such pre-Licence drivers are the focus of this paper.

Pre-Licence driving has been of interest not only in Australia (e.g., Lam, 2003a) but in countries around the world (e.g., Canada, Asbridge et al., 2005; the United States, Williams et al., 1997; New Zealand, Harre et al., 1996; Sweden, Hasselberg & Laflamme, 2009). The limited research exploring the behaviour of young people without a driver's licence has focused predominantly upon the involvement of drivers in car crashes, and unsurprisingly pre-Licence drivers have been found to be more likely to be at fault in fatal crashes (Williams et al., 1997). Frequent pre-Licence drivers (Blows et al., 2005) experience nearly double the risk of crashing during the first year of independent driving when they do hold a valid driver's licence than drivers who were not pre-Licence drivers (Stevenson & Palamara, 2001).

Pre-Licence driving has also been examined in surveys of novices who subsequently obtained a licence. Half of New Zealand's indigenous Maori population (McDowell et al., 2009) and 12% of Los Angeles high school students

were found to engage in pre-Licence driving (Carlos, Borba, Heck, Nathaniel, & Sousa, 2009). In addition, pre-Licence drivers have been found to have greater sensation seeking propensity (Begg et al., 2010; Senserrick et al., 2010). Furthermore, unlicensed driving – which includes pre-Licence driving – is more prevalent in rural than urban environments (Senserrick et al., 2010; Elliott et al., 2008). The prevalence of pre-Licence driving, however, remains unknown and is likely to be underestimated as minor crashes are under-unreported in official crash records (Watson, 1998).

In Queensland, Australia, the graduated driver licensing (GDL) program was modified in July 2007 to place more restrictions on Learner and Provisional drivers. Of note, Learners have to submit a logbook documenting 100 hours of supervised driving practice. While the changes were intended to reduce novice drivers' crash risk, it is possible they may inadvertently encourage more pre-Licence driving by increasing perceived barriers to licensing. Consequently, a longitudinal investigation exploring the ramifications of pre-Licence driving for the Learner and subsequent Provisional drivers, within this enhanced GDL context, can provide unique insight into its effects and potentially inform the development and evaluation of policy and countermeasures for pre-Licensed driving. The current study had four aims: 1) explore the incidence of pre-Licence driving among novice drivers post the GDL changes; 2) test the hypothesis that significantly more novices from rural areas, and drivers with higher sensation seeking, would report pre-Licence driving; 3) examine the relationship between pre-Licence driving and self-reported risky driving behaviour and attitudes; and 4) investigate the predictors of pre-Licence driving.

11.4 Methods

11.4.1 Participants

Drivers (n = 1032, 609 females) aged 17-19 years (M = 17.43, SD = 0.67) completed the Learner Survey (Learner drivers) shortly after obtaining their Provisional licence. Six months later, 355 of these drivers (108 females) completed the Provisional Survey (Provisional drivers). Approximately one third of novices were retained in the longitudinal research, however it is noteworthy that the Provisional Survey was conducted when 99% of the state of Queensland was declared a disaster after a wet season characterised by widespread flooding and cyclonic activity.

11.4.2 Materials

Both surveys incorporated sociodemographic questions such as age, gender, study status (*studying, not studying*), and their residential postcode which was collapsed into the corresponding accessibility/ remoteness index of Australia (ARIA) (Commonwealth Department of Health and Aged Care, 2001) code as *urban* (ARIA code 1) and *rural* (ARIA codes 2-5). Participants reported pre-Licence driving (*no, yes*; *number of times*), unsupervised driving (*no, yes*), and difficulty obtaining driving practice (*not difficult, neither, difficult*) in the Learner Survey. In both surveys, participants reported crash and offence involvement (*no, yes*), likelihood they would (1 = *very unlikely*, 7 = *very likely*) and intention to (1 = *definitely will not*, 7 = *definitely will*) bend road rules over the next year, how dangerous they thought bending rules was (1 = *very dangerous*, 5 = *not at all dangerous*), and how safe (1 = *not very safe*, 7 = *very safe*) and risky a driver (1 = *never risky*, 7 = *very risky*) they considered themselves. Participants completed the Brief Sensation Seeking Scale (BSSS) (Hoyle et al., 2002) (1 = *strongly disagree,* 5 = *strongly agree*) (Cronbach's α Learner Survey = .83, Provisional Survey = .80) and Behaviour of Young Novice Drivers Scale (BYNDS) (Scott-Parker et al., 2010) (1 = *never,* 5 = *nearly all the time*) (Cronbach's α Learner Survey = .88, Provisional Survey = .92) in both surveys.

11.4.3 Design and Procedure

Queensland drivers who progressed from a Learner to a Provisional (intermediate) driver's licence from April through June 2010 were invited to participate in longitudinal research commencing with the Learner Survey. Novices aged less than 20 years were considered in this study, since they had experienced the enhanced GDL program only. The online survey was administered using KeySurvey Enterprise Online Survey Software (IBM).

11.4.4 Statistical Analyses

Means were compared via analysis of variance and Pearson Chi-square tests. Multinomial logistic regression identified predictors of pre-Licence driving (*none*, *1-5 times*, *> 5 times*). No missing values were imputed. Analyses were evaluated at a significance level of $p = .05$ and conducted using Predictive Analysis SoftWare (PASW) version 18.0.

11.5 Results

11.5.1 Learner Survey, *n* = 1032

Twelve percent (n = 125) of Learners reported pre-Licence driving, with an average of 14.72 times (*SD* = 36.40, range 1 – 150, 81.0% ≤ 10 times). Learners currently in a relationship, who spoke a language other than English at home and were born in a country other than Australia reported more pre-Licence driving (Table 11.1). Pre-Licence drivers (PLDs) were significantly more likely to report driving unsupervised and being detected for a traffic offence as Learners, than those who were not PLDs Males and females had similar involvement in pre-Licence driving, but male PLDs did so more frequently (30.4% > 10 times) than females (7.0% > 10 times). A significantly greater proportion of male PLDs reported driving unsupervised and experiencing less difficulty obtaining driving practice while on their Learner licence than those participants who were not PLDs (Table 11.1).

Pre-Licence drivers reported significantly greater sensation seeking propensity (BSSS) (*M* = 24.66, *SD* = 6.84) than non-PLDs (*M* = 23.12, *SD* = 6.77). Male PLDs reported significantly greater personal propensity for sensation seeking (*M* = 26.80, *SD* = 6.33) than female PLDs (*M* = 23.29, *SD* = 6.83). The incidence of PLD among rural and urban participants did not differ, irrespective of gender.

A multinomial logistic regression conducted to explore the predictors of PLD incorporated sociodemographics, rurality and sensation seeking propensity (BSSS quartiles) and compared 'no PLD' with '1-5 times' and '> 5 times' groups of PLDs. The model was a good fit to the data, Pearson χ^2 (810) = 1076.99, p = .09, Nagelkerke R^2 = .082. Study status ($p < .05$) emerged as the only significant predictor, with Learners who reported that they had engaged in pre-Learner driving 5 or more times less likely to be studying (β = 1.62).

11.5.2 Longitudinal Research: Learner and Provisional Survey, *n* = 355

PLDs reported significantly more risky driving (BYNDS) as Learner and Provisional drivers (Table 11.2), and male PLDs reported significantly more risky driving than female PLDs. Male PLDs also reported being involved in more crashes and offences as Provisional drivers than female PLDs. In each survey, PLDs were significantly more likely to report they were unlikely to comply with, as well as held stronger intentions to bend, road rules in the future. PLDs reported they were less safe drivers at both licence levels. Compared to non-PLDs, PLDs reported not

Table 11.1 The pre-Licence driving characteristics reported by all the Learner (*n* = 1032), and the male, drivers (*n* = 423)

Key Measures		Pre-Licence Drivers		Male Pre-Licence Drivers	
		N	%	*N*	%
Learner Survey		***N* = 125**		***N* = 49**	
Age	17 Years	85	68.0	38	77.6
	18 Years	26	20.8	6	23.1
	19 Years	14	11.2	5	10.2
Gender	Male	49	39.2	_	_
	Female	76	60.8	_	_
Marital Status	Single	75	60.5 *	38	77.6 **
	Relationship	49	39.5	11	22.4
Education	Grade 12 or less	52	41.6	29	55.8 **
	> Grade 12	73	58.4	20	40.8
Study Status	Studying	98	78.4	39	76.6
	Not Studying	27	21.6	10	20.4
Employment	Working	88	70.4	34	69.4
	Not Working	37	29.6	15	30.6
Country of birth	Australia	108	86.4	43	87.8
	Not Australia	17	13.6	6	12.2
Language	English	112	89.6 ***	44	89.8
	Not English	13	10.4	5	10.2
Difficulty	Not Difficult	65	52.4	34	69.4 **
	Neither	30	24.2	9	18.4
	Difficult	29	23.4	6	12.2
Unsupervised	No	97	77.6 ***	15	30.6
	Yes	28	22.4	34	69.4
Crashes	No	119	95.2	48	98.0
	Yes	4	4.8	1	2.0
Offences	No	115	92.0 **	44	89.8
	Yes	8	8.0	5	10.2
Rurality	Urban (ARIA 1)	73	58.4	30	61.2
	Rural (ARIA 2-5)	52	41.6	19	38.8

Note: Sociodemographic characteristics were self-reported in Survey 2 (Provisional survey). Analyses utilised Chi-square tests. * $p < .05$, ** $p < .01$, *** $p < .001$.

following the road rules as a Learner was *more* dangerous; however these drivers subsequently reported not following road rules was *less* dangerous when they were a Provisional driver.

Table 11.2 The beliefs and behaviours of novice drivers self-reported in the Learner Survey and the Provisional Survey according to their experiences as a pre-Licence driver (n = 355)

Key Measures		Learner Survey		Provisional Survey	
		No Pre-Licence Driving *M (SD)*	Pre-Licence Driving *M (SD)*	No Pre-Licence Driving *M (SD)*	Pre-Licence Driving *M (SD)*
Driver Beliefs					
Risky Driver		1.99 (1.01)	2.32 (1.13) *	2.34 (1.24)	2.88 (1.23) **
Safe Driver		5.32 (1.26)	5.24 (1.32)	5.09 (1.31)	4.95 (1.17)
Likelihood of complying		2.87 (1.65)	3.64 (1.82) **	3.10 (1.79)	4.14 (1.79) ***
Intentions to comply		2.24 (1.44)	3.34 (1.91) ***	2.58 (1.63)	3.60 (1.68) ***
Dangerousness of non-compliance		1.81 (0.94)	1.69 (0.94)	1.85 (0.97)	2.05 (1.01)
Driver Behaviour					
Crash *N(%)*		9 (3.0)	3 (7.1)	32 (10.5)	5 (11.9)
Offence *N(%)*		3 (1.0)	5 (11.9) **	37 (12.0)	7 (16.7)
BYNDS	Composite	68.39 (9.34)	74.02 (11.10) ***	75.24 (14.85)	84.76 (14.63) ***
Subscales	Transient Violations	18.55 (4.63)	21.48 (5.29) ***	22.12 (7.14)	27.45 (8.26) ***
	Fixed Violations	10.34 (1.04)	10.50 (0.86)	10.58 (1.84)	10.86 (1.72)
	Misjudgement	13.17 (3.01)	13.24 (3.37)	12.22 (2.89)	12.71 (2.92)
	Risky Exposure	21.66 (3.40)	23.33 (4.43) **	25.05 (5.15)	27.55 (5.10) **
	Driver Emotions	4.67 (1.94)	5.48 (2.62) *	5.27 (2.29)	6.19 (2.71) *

Note: Analyses utilised analysis of variance. * $p < .05$, ** $p < .01$, *** $p < .001$.

11.6 Discussion

The research has provided insight into a comparatively neglected risky driving behaviour – young people driving on the road before entering the legal licensing system. Importantly, the research operationalised a longitudinal methodology which explored novice behaviour *prior* to entering the licensing system, as a *Learner*, and as a *Provisional* driver. One in eight Learner participants reported having engaged in pre-licence driving. PLDs were more likely to report engaging in continued risky behaviours as Learner and Provisional drivers, and whilst there were no differences in terms of rurality, PLDs had greater sensation seeking propensity.

Pre-Licence drivers are on the road without any demonstrated knowledge of road rules, or skills and abilities in hazard perception, car control and safe road use (Heck et al., 2008). Therefore they may pose a threat not only to their own safety but also to that of other road users. The age of the pre-Licence driver also merits consideration, as age-related variables have been found to be influential in young novice driver behaviour and crash involvement (Waller et al., 2001). Under Queensland's former GDL program, drivers who engaged in pre-Licence driving because they had not yet reached licensing age could be aged up to 16.5 years old. Under Queensland's enhanced GDL program, these same novices now would be aged up to only 16 years of age. Whilst the survey did not incorporate items that measured the age at which the pre-Licence driving was undertaken, nor the duration between pre-Licence driving and when the novice obtained their Learner driver's licence, the younger age of this group of risky drivers may have considerable consequences for road safety. Adolescents aged less than 16 years should be encouraged not to engage in pre-Licence driving; rather they should wait to drive on the road until after they have successfully passed the Learner theory test, allowing them to develop safe road use and road rule knowledge.

The literature has reported that PLDs are more likely to be involved in single vehicle crashes (Hanna, Hasselberg, Laflamme, & Moller, 2010), and the pre-licence driving participants in the current study reported more risky driving behaviour over time and across driver's licence, and they continued to state that they were less likely to follow road rules in their future driving. As such, it appears that pre-Licence driving may be a good predictor of risky driving. Future research is needed however to elucidate whether such pre-Licence driving predisposes young people to later

risky driving, or whether young people who take risks as drivers are predisposed to drive before they get a licence and then continue to drive in risky ways. Interventions may need to be developed to address both possibilities, focusing on preventing pre-Licence driving whilst young people detected as PLD may require additional interventions, particularly as PLDs were found to have greater sensation seeking propensity. Targeted interventions also need to consider the gender differences in PLD. Specifically, male PLDs reported a greater propensity for sensation seeking, less difficulty obtaining supervised driving practice, and more risky and unsupervised (Learner) driving than females.

GDL programs and their features have been appraised for their effectiveness in reducing young driver crashes and fatalities (Williams et al., 2010); however, they may inadvertently be contributing to pre-Licence driving (Senserrick et al., 2010); particularly in Queensland, with the inclusion of the 100-hour minimum logbook requirement. Pre-Licence driving hours may have been recorded in the Learner logbook upon licensure. Parents could discuss their planned instruction method with their pre-Licence child so that logbook requirements can be met as easily as possible thus discouraging pre-Licence driving if PLD mistakenly believe they will have difficulty obtaining practice. The majority of the PLD reported that obtaining supervised driving practice as a Learner was not difficult; therefore it appears that anticipated difficulty is unlikely to be the reason for the PLD.

A considerable amount of variance in predictors of pre-Licence driving remained unexplained by sociodemographic and sensation seeking characteristics, suggesting practical considerations such vehicle availability are influential (Carlos et al., 2009; Senserrick et al., 2010). Parents are pivotal in providing driving and practice opportunities, and potentially pre-Licence driving, because it is frequently the family car that is being driven. PLD were more likely to subsequently drive unsupervised; suggesting that a lack of parental supervision may be a contributing factor. Parents should be encouraged to monitor their child's driving behaviour. Friends may similarly be influential, with a lack of punishment and covert encouragement likely to reinforce unsafe driving practices, whilst overt encouragement is likely to provide the impetus to undertake pre-Licence driving (Scott-Parker et al., 2012b).

Accordingly, future research could identify other variables involved in pre-Licence driving such as the availability of alternative transport, and pre-Licence

driving circumstances such as the time of day and the day of the week of the journey, and the reasons for the pre-Licence driving. Research could also explore if future costs are a factor in getting a Learner licence in the enhanced GDL program in Queensland as has been suggested (Senserrick et al., 2010) and has been found in other jurisdictions (Carlos et al., 2009). The pre-Licence driver should also be asked if parents and friends were aware that the young person was engaging in the behaviour, and if they were aware attempts should be made to establish the nature of their involvement (e.g., condone, lack of punishment). This knowledge could then be used to guide targeted interventions. Longitudinal research could also continue to provide unique insight into the long-term effects of pre-Licence driving, and adolescents could be surveyed biannually from 15 years of age to explore their sociodemographic characteristics, parental and peer influence, car availability, and frequency of pre-Licence driving and licensed driving behaviours and attitudes. Future research should continue to explore the role of attitudes and intentions in pre-Licence driving and risky behaviour by the young novice driver.

This research has a number of strengths, including the diverse state-wide sample of young drivers progressing through an enhanced GDL program, minimal missing data, and being the first to offer an exploration of the relationship between pre-Licence driving, rurality and sensation seeking propensity in a Queensland novice driver population. In addition, the sample of novices reflected the population distribution profile of Queensland residents (60.0% of Queensland's 2006 population and 62.2% of the research participants resided in ARIA 1). However, it is not without limitations. The research was not designed specifically to explore pre-Licence driving and therefore circumstances surrounding pre-Licence driving, such as journey purpose, were not investigated. The Learner Survey was characterised by a low response rate overall [14.4% of 9393 eligible Learners of all ages participated in the larger research project, however privacy restrictions preclude calculation of the proportion of Learners aged 17-19 years who chose to participate in the Survey (Learner Survey respondents were aged 17-39 years, however only those participants aged 17-19 years were considered in the present analyses)], and a greater proportion of Learners aged 17 years chose to participate (66.3% of the participants compared to 49.8% of Queensland's drivers with a Learner licence). In addition, there was considerable attrition from the longitudinal research, however separate analyses were undertaken to account for this. Reliance on self-report data is a further limitation

however data regarding PLD is unable to be collected via any other means. Anonymity afforded by the online survey, and the lack of legal consequences, is likely to have minimised potential biases.

Driving on the road before entering the licensing system is a risky behaviour associated with considerable risks not only for the young driver, but to all persons who share the road with them. Twelve percent of Learners surveyed as they progressed through an enhanced GDL program reported they had driven on the road before they had a Learner licence, and pre-Licence drivers reported more risky driving intentions, and involvement in traffic offences, as well as appearing more risky drivers in general. The findings highlight the need for interventions to target the young person and their parents *before* they are eligible for a Learner licence. Young people should be encouraged to drive only with a valid licence and to refuse to travel as a passenger of a pre-Licence driver. Parents should be encouraged to monitor their child's behaviour, and to discourage pre-Licence driving in any circumstance.

11.7 Chapter summary

Chapter Eleven is the fourth in the series of papers examining the self-reported risky behaviour of the young novice driver in an enhanced GDL program in Queensland. The risky behaviour of driving on the road before successfully completing a Learner Theory Test was examined in a state-wide sample of young novice drivers. Importantly, the relationship between pre-Licence driving and the behaviour of the novice as a Learner or Provisional driver in their first six months of independent driving was also investigated. It is noteworthy that PLD were more likely to be risky drivers as Learners and Provisional drivers, and interventions need to target PLDs who may be developing a habit of risky driving behaviour even prior to valid licensure. PLD appear to be a high risk group who continue to engage in risky driving behaviour as licensed road users. The next chapter, Chapter Twelve, considers the role of mileage, car ownership and the experience of punishment avoidance in the self-reported risky behaviour of the young novice driver, thereby further informing our understanding of the risky behaviour of the young novice driver.

Chapter Twelve: Mileage, Car Ownership, Experience of Punishment Avoidance and the Risky Driving of Young Drivers

12.1 Notes

Taken from:

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2011). Mileage, car ownership, experience of punishment avoidance and the risky driving of young drivers. *Traffic Injury Prevention, 12*(6), 559-567. doi: 10.1080/15389588.2011.621000.

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas and arguments, analysing the data, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

The journal in which this paper was published is a peer-reviewed journal with international readership. The journal is listed in the Social Sciences Citation Index and recognised for HERDC. The 2010 Impact Factor for this journal is 1.401, and it is ranked 51/142 in Public Environmental and Occupational Health, Science. The publisher of this article (Taylor and Francis) states in their Author Rights that the author retains "the right to include an article in a thesis or dissertation that is not to be published commercially, provided that acknowledgement to prior publication in the relevant Taylor & Frances journal is made explicit."

This paper, Paper Eight, comprises the third paper that utilises data collected in both Stages Two (Learner Survey) and Three (Provisional Survey) and operationalises the BYNDS, the instrument created in the first paper, Chapter Five. The paper the influence of mileage, car ownership, and the experience of punishment avoidance upon their risky driving behaviour, extending the qualitative findings of Paper Four (psychosocial influences of parents, peers, and the Police) and the quantitative findings of Paper Five (exploration of the impact of GDL changes on

Learner experiences and behaviours), Six (compliance with GDL-specific and general road rules) and Seven (pre-Licence driving).

12.2 Abstract

Objective: Young drivers are at greatest risk of injury or death from a car crash in the first six months of independent driving. In Queensland, the graduated driver licensing (GDL) program was extensively modified in July 2007 in order to reduce this risk. Increased mileage and car ownership have been found to play a role in risky driving, offences and crashes; however GDL programs typically do not consider these variables. In addition, young novice drivers' experiences of punishment avoidance have not previously been examined. The paper explores the mileage (duration and distance), car ownership and punishment avoidance behaviour of young newly-licensed intermediate (Provisional) drivers and their relationship with risky driving, crashes and offences.

Methods: Drivers (n = 1032) aged 17-19 years recruited from across Queensland for longitudinal research completed Survey 1 exploring pre-licence and Learner experiences and sociodemographic characteristics. Survey 2 explored the same variables with a subset of these drivers (n = 341) after they had completed their first six months of independent driving.

Results: Most young drivers in Survey 2 reported owning a vehicle and paying attention to Police presence. Drivers who had their own car reported significantly greater mileage and more risky driving. Novices who drove more kilometres, spent more hours each week driving, or avoided actual and anticipated Police presence were more likely to report risky driving. These drivers were also more likely to report being detected by Police for a driving-related offence. The media, parents, friends and other drivers play a pivotal role in informing novices of on-road Police enforcement operations.

Conclusions: GDL programs should incorporate education for the parent and novice driver regarding the increased risks associated with greater driving particularly where the novices own a vehicle. Parents should be encouraged to delay exclusive access to a vehicle for the novice driver. Parents should also consider whether their young novice will deliberately avoid Police if they tell them their location. This may reinforce not only the risky behaviour but also the young novice's beliefs that their parents condone this behaviour.

12.3 Introduction

Young novice drivers around the world are injured and killed in road crashes at rates that far exceed those of older, more experienced drivers. In Queensland, Australia, the graduated driver licensing (GDL) program was extensively modified in July 2007. It aims to minimise novice drivers' risk by requiring a minimum amount of supervised driving practice followed by a gradual reduction in driving restrictions as the novice gains more driving experience. Key components of the enhanced GDL program include the introduction of a minimum 12 month Learner period during which 100 hours of supervised driving practice must be certified in a logbook, 10 hours of which must be at night. The Provisional (intermediate) phase was also enhanced, and all Provisional drivers are prohibited from driving a high-powered (performance) vehicle, including those with eight or more cylinders. (Queensland Transport, 2007e). The novice first progresses to a Provisional 1 (P1) licence which also must be held for a minimum of 12 months. P1 novices are unable to carry more than one passenger (excluding family members) between 11pm and 5am. P1 drivers must pass a hazard perception test to progress to a Provisional 2 (P2) licence which must be held for a minimum of 24 months, before progressing to an Open (unrestricted) licence (Queensland Transport, 2007f). Traditionally the Learner phase is a relatively safe period for the novice driver, with the greatest risk of injury or death from a car crash occurring during the first six months of independent driving. In Queensland in 2008, 3.7% of drivers held a Learner licence, and only 1.5% of drivers involved in a fatal crash had a Learner licence. In comparison, 6.0% of drivers held a Provisional licence, whilst these drivers were involved in 11.8% of fatal crashes that year (DTMR, 2009).

In addition to their age (Braitman et al., 2008) and associated neurological (Steinberg, 2008) and psychosocial (Keating, 2007) maturation and underdeveloped hazard perception skills (Lee et al., 2008), a number of behavioural and motivational factors have been found to influence the risky behaviour of young novice drivers, which in turn places them at greater risk of injury or fatality in a road crash. These influences include variables such as exceeding speed limits (Blows et al. 2005), driving at night (Ward et al., 2005), and the influence of friends who frequently travel as their passengers (Scott-Parker et al., 2009b).

Vehicle ownership has also emerged in the literature as a contributing variable, with high levels of vehicle ownership and primary access to a vehicle found

amongst the most inexperienced and youngest drivers. Between 28% (Cammisa et al., 1999) and 70% (Garcia-Espana et al., 2009) of novices reported having either their own vehicle or primary access to a vehicle at licensure, with ownership rates increasing during the intermediate period (Williams et al., 2006). Different methodologies including surveys, interviews, instrumented vehicles and travel diaries in cross sectional and longitudinal research have revealed that car ownership is associated with more risky driving behaviour such as speeding (e.g., Cammisa et al., 1999; Garcia-Espana et al., 2009), particularly at night and whilst carrying their friends as their passengers (e.g., Klauer et al., 2011), crashes (e.g., Williams et al., 2006) including 'hooning' crash involvement (e.g., Palk et al., 2011), offences (e.g., Hirsch et al., 2006), and greater mileage (e.g., Leaf, Simons-Morton, Hartos, & Northrup, 2008). Moreover, greater duration of ownership corresponds to more offences by and crashes involving young novice drivers (Williams et al., 2006). As noted above, the GDL program in Queensland was considerably enhanced in July 2007. Whilst GDL programs have proven to be effective in reducing the road crash involvement of young novice drivers, these drivers continue to be overrepresented in crash statistics. Vehicle ownership and mileage have been found to be contributing variables, and the vehicle ownership and mileage characteristics of young novice drivers in the enhanced GDL program remain unknown.

In contrast, a behaviour which has not received much attention is young novice drivers' avoidance of Police traffic law enforcement operations, and the relationship of this behaviour with risky driving, crashes and offences. Avoiding Police allows the novice to evade detection for driving related–offences such as drink driving, speeding and driving without a license, and other offences such as illegal vehicle modifications and the operation of performance vehicles (Scott-Parker et al., in press). A number of recent studies framed within Akers' social learning theory and deterrence theory have confirmed that the experience of punishment avoidance is a strong predictor of illegal and risky driving behaviour such as speeding (e.g., Fleiter & Watson, 2005). Avoidance of Police requires the novice driver to 'pay attention' to Police presence. In Queensland, traffic reports are broadcast on radios, frequently in conjunction with general news reports and more often during peak hour commute times. These broadcasts not only inform drivers of traffic congestion and commuting delays, but notify drivers of the roads upon which Police currently have speed enforcement, and occasionally alcohol breath testing,

operations. Drivers also are able to telephone radio stations to report Police operations that have not previously been identified in the broadcast(s). In recent times Facebook pages have increasingly contained information regarding Police presence (PerthNow, 2011), whilst mobile phone apps can alert drivers to active, targeted Police enforcement activities (Lowensohn, 2008). In addition, a proportion of drivers 'flash' their headlights at the oncoming traffic to warn drivers that they are entering a segment of road in which Police are operating an enforcement program. Whilst 'flashing' is illegal (and punishable by 1 demerit point and a $40 fine in Queensland, DTMR, 2010b), controversially Police in another Australian state have operated their vehicle lights to warn drivers of the presence of their speed camera as part of their negotiation for a salary increase (Dowsley & Buttler, 2011). Accordingly it is important that the role paying attention to and avoiding of Police plays in the risky behaviour of young novice drivers is examined, and such an investigation is timely in light of recent Police actions.

This paper will explore the self-reported mileage, Police avoidance experiences and car ownership characteristics of young novice drivers progressing through an enhanced GDL program in relation to their risky driving at three time points: 1) before they obtain their Learner driver's licence ('pre-Licence' driving); 2) as a Learner driver; and 3) during the first six months of independent driving with a Provisional (P1) licence. This risky driving includes self-reported crashes and offences. In addition, whilst it appears that 'paying attention' to Police presence is normative in the general Queensland driving culture, it is unknown if this behaviour is related to the driving behaviour of young novices, such as evading punishment. The manner in which the young novice driver becomes aware of actual and anticipated Police presence also has not been examined. Accordingly the paper will also explore the phenomenon of paying attention to and avoidance of Police presence on Queensland roads. In addition, other forms of punishment avoidance such as the novice "talking their way out of a ticket" when they had been pulled over by Police, or parents claiming they were the driver in the instance of camera-detected offences (where the vehicle is identified, not the driver), will also be investigated.

Road safety researchers have suggested that novice drivers with their own car may be predisposed to risky driving behaviour, and that the vehicle allows the operationalisation of this tendency (e.g., Cammisa et al., 1999; Klauer et al., 2011). This predisposition pertains to both psychological states and traits. The

psychological state of the novice, specifically their depression and anxiety, has been found to explain risky driving behaviour (Scott-Parker et al., 2011a). The psychological traits of sensitivity to reward and sensation seeking propensity have also been found to explain risky driving behaviour (Scott-Parker et al., 2012c). The relationships between anxiety, depression, sensitivity to reward and sensation seeking propensity, and vehicle ownership, driving exposure, paying attention to, and avoiding Police presence have not been explored.

12.4 Methods

12.4.1 Participants

One thousand and thirty-two drivers (609 females, 423 males) aged 17 to 19 years (M = 17.43, SD = 0.67) volunteered to complete the 30-minute Survey 1. They had just passed their Q-Safe Practical Driving Assessment and progressed from a Learner to a P1 driver's licence. Six months later, 355 of the novice drivers (108 males, 247 females) aged 17 to 20 years (M = 17.83, SD = 0.91) completed Survey 2. Car ownership information was provided by 341 of these drivers.

Whilst 34.4% of the Learner participants were retained for the second survey, much of this attrition can be attributed to the extreme weather conditions (torrential rain, extensive flooding, and cyclones) which resulted in 99% of the state being declared a disaster area (AAP, 2011). Numerous areas of the state were characterised by widespread and sometimes long-term loss of access to electricity, and therefore the email and internet access necessary for the surveys was also not available. Chi-square analyses were undertaken to compare the sociodemographic characteristics of the Learners who completed the second survey to the Learners who did not. The Learners who completed both surveys were significantly more likely to be female and to be studying. No other significant differences were found.

12.4.2 Materials

The cross-sectional surveys included nine sociodemographic questions (see Tables 12.1 and 12.2). In Survey 1, novices self-reported if they had driven on-road before obtaining a Learner's licence (*pre-Licence driving*), the amount of *difficulty* they experienced obtaining supervised driving practice when they were a Learner (1 = *very difficult*, 5 = *very easy*), the *number of logbook hours* recorded while on their Learner driver's licence, the *duration* that the Learner driver's licence was held, and

if they drove *unsupervised* on their Learner's licence. In both surveys, drivers reported if they had been involved in a *crash* or detected by Police for a driving *offence*, if they *paid attention* to or *avoided* the Police, and if they had *talked their way out of a ticket* or their *parents had taken the punishment* (which may include a monetary fine and/or penalty points) on their behalf. Novices also completed the Behaviour of Young Novice Drivers Scale (BYNDS) (Scott-Parker et al., 2010) (Cronbach's α Survey 1 = .88, Survey 2 =.92) in both surveys using a Likert scale ranging from 1 (*never*) to 5 (*nearly all the time*). Higher scores on the BYNDS indicate more risky driving behaviour. Survey 2 also investigated the intermediate novice's *driving exposure: duration* measured as the number of hours in a typical week during the last month; *distance* measured as the number of kilometres in a typical week during the last month; *consistency* measured by the novice indicating when they drove more (when initially obtained Provisional licence/ consistently throughout/ recently). Both surveys incorporated the Brief Sensation Seeking Scale (Hoyle et al., 2002), higher scores indicating greater sensation seeking propensity; an abridged Sensitivity to Reward Questionnaire (Scott-Parker et al., 2012d); and Kessler's psychological distress scale (Kessler & Mroczek, 1994, cited in Andrews & Slade, 2001), higher scores indicative of greater anxiety and depression.

12.4.3 Design and Procedure

Participants were recruited from across Queensland as they progressed from supervised to independent driving. Every person in Queensland who passed their Practical Driving Assessment and progressed from a Learner to a P1 licence between 1 April and 30 June 2010 received a flyer from the government licensing centre inviting them to participate in a larger research study. This longitudinal project was designed to investigate the novice drivers' sociodemographic characteristics; their driving attitudes and experiences within the GDL program; and a range of psychosocial influences upon their driving behaviour (herein the participants who responded to Survey 1 are referred to as Learner drivers). After six months had elapsed, Learner drivers were offered the opportunity to complete Survey 2, exploring the same sociodemographic and driving experiences in the context of being a Provisional (intermediate) driver (herein those participants responding to Survey 2 are referred to as Provisional drivers). To ensure that the participants had progressed through the enhanced GDL program *only*, novices who reported being 19

years of age or less at the time of Survey 1, and novices who reported that they were 20 years of age or less at the time of Survey 2, were included in the analyses. Both online survey tools were administered using KeySurvey Enterprise Online Survey Software.

12.4.4 Statistical Analysis

Means were compared using either analysis of variance (ANOVA) or the non-parametric Kruskal-Wallis test depending on the normality of the variables in question. The Pearson chi-square test was used for analysing the categorical variables. Bivariate correlations between continuous variables utilised Pearson's product moment correlation (r). Missing data was not imputed; rather cases were deleted pair-wise as appropriate. All analyses were evaluated at a significance level of $\alpha = .05$. Analyses were conducted using PASW version 18.0.

12.5 Results

Most Provisional drivers reported they owned their own vehicle (78.4%). Whilst they reported driving an average of 174.8km (SD = 162.98) each week, 52% reported driving 100km or less each week. Driving occupied 7.38 hours (SD = 9.01) of their time each week, with 86.7% of Provisional drivers reporting driving for 10 or less hours each week. There were no significant differences in exposure according to gender (males: mileage M = 190.2km, duration M = 7.3 hours; females: mileage M = 167.9km, duration M = 7.4 hours) nor residential location (rural: mileage M = 183 km, duration M = 7.0 hours; urban: mileage M = 170 km, duration M = 7.7 hours). Greater exposure was associated with more self-reported risky driving (BYNDS composite cf. hours $r = .20$, $p < .001$; BYNDS composite cf. kilometres $r = .27$, $p < .001$). The majority of Provisional drivers (46.5%) reported that their driving exposure was similar throughout the six months of their intermediate licence, whilst 36.8% reported greater exposure recently and the remaining 16.7% reported greater exposure when they first progressed from a Learner to a Provisional driver's licence. Ten percent of male and female novices reported crash involvement, whilst more males (18.1%) than females (10.1%) reported they had been detected for a driving offence, as a Provisional driver.

Ninety-one percent of Learner drivers, and 72% of Provisional drivers reported they paid attention to reports of Police presence on the road. The most

common mechanisms of the Provisional driver hearing about Police presence were via the radio and news reports (100 Provisional drivers), friends (68 Provisional drivers), family (57 Provisional drivers), seeing them on the side of the road (52 Provisional drivers), and other drivers flashing their lights (26 Provisional drivers). There were no significant gender differences in the extent to which Provisional drivers reported paying attention to Police presence. Sixteen percent of Learner and Provisional drivers reported that they avoid the areas where Police are, or are likely, to be. Males (25.0%) were significantly more likely to report that they avoided actual and anticipated Police presence as Provisional drivers than females (12.7%), and Provisional drivers from rural areas also reported more avoidance (23.4%) than those from urban areas (15.1%).

Tables 12.1 and 12.2 summarise the sociodemographic and driving behaviour variables for the Provisional driver according to their car ownership as a Provisional driver. Drivers who were born in Australia, lived in an English-speaking home, were not studying and who were employed were significantly more likely to own a car, as were novices who reported a shorter duration of the Learner licence and more hours recorded in their Learner logbook. Provisional drivers with their own car reported significantly greater driving exposure as measured by the number of kilometres driven recently, and to report they had 'talked their way out of a ticket' (punishment avoidance) as a Provisional driver.

Whilst there was a significantly greater incidence of self-reported risky driving (BYNDS) by Provisional drivers who owned their own car, upon closer examination the main risk factor appears to be their increased risky driving exposure (as measured by a subscale of the BYNDS). To illustrate, Provisional drivers with a car were significantly more likely to report driving at times and in circumstances that are particularly risky for young novice drivers, such as on the weekend, at night, and with their friends as their passengers.

There was no difference in car ownership according to driver gender or relationship status. Provisional drivers who were younger and consequently less educated, and who resided in rural areas reported greater car ownership, as did drivers who reported they did not engage in pre-Licence driving, did not engage in unsupervised driving as a Learner, and avoided Police as a Provisional driver; however these differences were not statistically significant. In addition, there were no differences in sensation seeking, reward sensitivity, depression and anxiety.

Table 12.1 The percentage of young novice drivers who own a car, attend to, and avoid Police presence on the road

Key Measure		Own car	Attend	Avoid
Sociodemographics				
Gender [1]	Male	78.1	70.5	**24.8****
	Female	78.6	72.0	**12.7**
Age [1]	17 years	79.9	32.1	18.2
	18 years	78.6	23.9	16.2
	19 years	75.0	25.9	13.0
	20 years	72.7	36.4	90.9
Australian-born [1]	Yes	**80.8****	**73.0***	16.4
	No	**54.8**	**14.3**	16.7
Speak English at home [1]	Yes	**80.2****	72.5	15.9
	No	**40.0**	50.0	28.6
Marital Status [1]	Single	78.9	69.9	15.9
	Relationship	77.6	74.8	17.4
Education[1]	≤ Year 12	79.1	69.7	15.9
	Tertiary	74.5	82.4	19.6
Studying [1]	Yes	**74.5***	72.0	14.5
	No	**83.9**	70.9	19.1
Employed [1]	Yes	**82.5****	73.7	18.4
	No	**67.1**	64.7	10.6
Location [1]	Urban	77.1	71.0	17.4
	Rural	87.5	72.1	14.7
Driving Behaviour: Pre-Licence [1]	Yes	75.6	80.5	17.1
	No	78.8	70.3	16.3
Driving Behaviour: Learner Licence				
Logbook accuracy [1]	Accurate	**76.0***	70.0	16.3
	Inaccurate	**87.5**	77.5	21.4
Unsupervised Learner [1]	Yes	75.0	80.6	32.3
	No	78.8	70.6	14.8
Crash [1]	Yes	72.7	81.8	27.3
	No	78.4	71.3	15.9
Offence [1]	Yes	100.0	87.5	37.5
	No	77.8	71.3	15.7
Driving Behaviour: Provisional Licence				
'Talk out of' ticket [1]	Yes	**100.0***	76.9	**46.2***
	No	**77.4**	72.1	**15.5**
Parent 'took punishment' [1]	Yes	78.3	77.8	22.2
	No	88.9	72.1	16.5
Pay attention to Police [1]	Yes	80.9	_	**20.9*****
	No	77.0	_	**5.2**
Avoid Police [1]	Yes	77.4	**91.1*****	_
	No	80.2	**67.7**	_
Crash [1]	Yes	85.7	74.3	17.1
	No	77.3	71.4	16.4
Offence [1]	Yes	83.7	76.7	20.9
	No	77.6	70.8	15.8

Note: Significant differences evaluated at the level of .05 have been highlighted in bold for ease of reference. Sociodemographic characteristics were self-reported in Survey 2 (Provisional survey). – = not applicable. * $p < .05$, ** $p < .01$, *** $p < .001$. [1] Analyses utilised Chi-square tests. [2] Analyses utilised analysis of variance. [3] Analyses utilised Kruskal-Wallis tests.

Most crashes (n = 33, 95%) were reported by Provisional drivers residing in urban areas. Provisional drivers who reported being involved in a crash as a Learner driver (n = 11) were less likely to report they owned a car, whilst Provisional drivers who reported being detected for an offence as a Learner driver (n = 8) or a Provisional driver (n = 43) and being involved in a crash (n = 35) as a Provisional driver were more likely to report owning a car. While these differences were not statistically significant, the small sample size at follow-up may have precluded reliable analyses.

Table 12.3 summarises the sociodemographic and driving behaviour variables for the Provisional driver according to their reported driving exposure (distance and duration) as a Provisional driver. The young drivers who had been detected for a driving offence as a Provisional driver reported significantly greater duration and distance of driving exposure. The young Provisional drivers who had talked themselves out of a ticket reported significantly greater weekly driving distance, whilst drivers whose parents had taken the fine on their behalf reported significantly greater weekly driving duration. Although not statistically significant, more exposure (both kilometres and duration) was associated with self-reported pre-Licence driving, crashes and unsupervised driving as a Learner, and talking oneself out of a ticket and crashes as a Provisional driver.

Drivers who reported more exposure when they were first licensed (10.7%), or throughout their Provisional period (12.0%), reported more crash involvement than novices who reported more exposure recently (8.1%). In comparison, more offences were detected for those drivers with greater recent exposure (13.5%) than those with more exposure when they were first licensed (10.5%). A similar pattern of paying attention to and avoiding Police presence was found (greater recent exposure: 74.4% pay attention, 18.4% avoid Police; similar exposure throughout: 70.3% pay attention, 15.2% avoid Police; greater initial exposure: 68.4% pay attention, 15.8% avoid Police).

Tables 12.1 and 12.2 also summarise the sociodemographic and driving behaviour variables for the Provisional driver according to whether they reported paying attention to Police presence or not as a Provisional driver. Young Provisional drivers who reported paying attention to warnings about Police presence on the road were significantly more likely to be born in Australia, educated above a Senior (Year 12) level, and employed.

Table 12.2 Means and standard deviations for the non-categorical survey items for a longitudinal sample of young novice drivers in Queensland, Australia

Key Measure		Own car		Attend		Avoid	
		Yes	No	Yes	No	Yes	No
		M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Psychological Traits and States							
Sensation seeking propensity (BSS) [1]		23.0 (6.6)	23.4 (6.7)	23.5 (6.6)	22.1 (6.6)	**26.5 (6.8)**	**22.4 (6.4)*** **
Reward Sensitivity (Abridged SRQ) [1]		3.4 (2.4)	3.6 (2.5)	**3.6 (2.4)**	**4.0 (2.3)***	**5.0 (2.7)**	**3.1 (2.3)*** **
Anxiety (K10 subscale) [1]		7.2 (2.8)	7.1 (2.5)	7.1 (2.8)	6.7 (2.4)	10.7 (4.7)	10.5 (4.4)
Depression (K10 subscale) [1]		10.7 (4.6)	9.8 (3.8)	10.6 (4.8)	10.3 (4.2)	7.4 (2.9)	7.1 (2.7)
Driving Behaviour: Learner Licence							
Practice difficulty [1]		3.6 (1.1)	3.4 (1.2)	3.5 (1.1)	3.5 (1.1)	**3.2 (1.2)**	**3.6 (1.1)** *
Duration [2]		**15.8 (5.1)**	**18.7 (7.2)*** **	16.5 (5.7)	16.3 (6.1)	15.8 (5.2)	16.5 (5.9)
Hours in logbook [2]		**107.0 (16.0)**	**102.5 (20.0)*** **	106.3 (18.1)	105.4 (14.5)	107.2 (20.2)	105.8 (16.5)
Driving Behaviour: Provisional Licence							
Exposure [2]	Hours	**7.6 (8.8)**	**6.3 (9.8)** *	7.6 (9.0)	6.8 (9.1)	6.4 (7.6)	7.6 (9.3)
	Kilometres	**193.4 (170.2)**	**97.7 (96.8)*** **	183.3 (167.1)	152.4 (151.5)	170.0 (160.8)	176.3 (165.0)
BYNDS	Composite [1]	**77.2 (15.4)**	**72.4 (13.8)***	76.9 (14.3)	74.5 (17.0)	**82.5 (17.2)**	**75.0 (14.4)***
	Transient Violations [1]	22.9 (7.6)	21.8 (6.7)	33.0 (7.1)	22.0 (8.1)	**26.4 (9.0)**	**22.0 (6.8)*** **
	Fixed Violations [2]	10.7 (2.0)	10.4 (0.8)	10.5 (1.2)	10.8 (2.9)	**10.9 (1.5)**	**10.6 (1.9)** *
	Misjudgement [2]	12.2 (3.0)	12.3 (2.6)	12.3 (2.8)	12.2 (3.2)	12.4 (2.8)	12.2 (2.9)
	Risky Exposure [1]	**26.0 (5.0)**	**22.7 (5.2)*** **	**25.7 (5.2)**	**24.3 (5.2)***	**26.6 (5.6)**	**25.1 (5.1)***
	Driver Mood [1]	5.4 (2.4)	5.3 (2.2)	5.4 (2.2)	5.2 (2.5)	**6.2 (2.4)**	**5.2 (2.3)** *

Note: Significant differences evaluated at the level of .05 have been highlighted in bold for ease of reference. Psychological traits and states were self-reported in Survey 2 (Provisional survey). – = not applicable. * $p < .05$, ** $p < .01$, *** $p < .001$. [1] Analyses utilised analysis of variance.[2] Analyses utilised Kruskal-Wallis tests.

They were also significantly more likely to have been detected for an offence, have had their parents 'taken the punishment' and to have been involved in a crash as a Learner, to avoid Police and to report more risky driving (transient violations such as speeding) as a Provisional driver. Provisional drivers who paid attention to Police presence reported significantly greater reward sensitivity.

Tables 12.1 and 12.2 also summarise the sociodemographic and driving behaviour variables for the Provisional driver according to their avoidance of actual and anticipated Police presence as a Provisional driver. Young Provisional drivers who reported avoiding Police presence on the roads were significantly more likely to have reported risky driving as a Provisional driver (BYNDS composite and four of the five subscales), to have had less difficulty obtaining Learner driving practice, and to have talked themselves out of a ticket. They were also significantly more likely to be male, to have driven unsupervised as a Learner, and to pay attention to Police presence. Provisional drivers reported significantly greater sensation seeking propensity and sensitivity to reward.

12.6 Discussion

Consistent with previous research (Garcia-Espana et al., 2009), the young novice drivers in this study reported a relatively high rate of vehicle ownership, particularly for those who were employed (Cammisa et al., 1999; Garcia-Espana et al., 2009) and had greater driving exposure (Ehsani et al., 2010; Leaf et al., 2009; Williams et al., 2006). Contrary to prior research (Garcia-Espana et al., 2009), higher rates of ownership were found for rural drivers. In addition, young novices reported greater exposure than previous research has indicated (e.g., Lee et al., 2011), which is particularly important as self-reported exposure is likely to be underestimated (Leaf et al., 2008) and, in the circumstance of the current research, much of the state was experiencing an exceptionally wet summer which may have affected the nature of recent journeys.

Interestingly novices who crashed as a Learner reported less car ownership as a Provisional driver. It may be that these novices had been and continue to be punished by their parents, that they have had a negative emotional response to the crash (Scott-Parker et al., 2012b), or that they had crashed the family's 'spare car' which would have otherwise been given to the Provisional driver for their own use. In contrast, every Learner who had been detected for an offence subsequently owned

Table 12.3 Exposure characteristics for a longitudinal sample of young novice drivers in Queensland

Key Measure		Duration (hrs) *M (SD)*	Distance (km) *M (SD)*
Sociodemographics			
Gender [1]	Male	7.3 (9.8)	190.2 (167.8)
	Female	7.4 (8.7)	167.9 (160.7)
Age [1]	17 years	7.2 (9.4)	**173.7 (142.4)***
	18 years	8.3 (9.9)	**192.9 (181.8)**
	19 years	5.9 (5.7)	**135.0 (169.1)**
	20 years	8.3 (6.0)	**197.0 (190.0)**
Australian-born [1]	Yes	7.6 (9.4)	178.0 (166.0)
	No	5.6 (3.6)	144.1 (128.7)
Speak English at home [1]		7.5 (9.8)	173.3(165.3)
	No	4.5 (2.6)	99.3 (66.2)
Marital Status [1]	Single	7.3 (9.1)	**153.7 (153.5)****
	Relationship	7.6 (8.2)	**215.0 (173.4)**
Education [1]	≤ Year 12	7.5 (9.4)	165.1 (150.0)
	Tertiary	6.8 (6.3)	231.2 (217.5)
Studying [1]	Yes	7.1 (8.3)	166.7 (151.1)
	No	7.7 (10.0)	185.9 (177.9)
Employed [1]	Yes	**7.6 (8.7)***	153.0 (160.3)
	No	**6.9 (9.9)**	182.6 (163.8)
Location[1]	Urban	**7.7 (8.5)***	169.9 (157.2)
	Rural	**7.0 (9.9)**	183.3 (172.5)
Driving Behaviour: Pre-Licence			
Pre-Licence driving [1]		9.4 (10.9)	209.3 (160.4)
	No	7.1 (8.7)	170.0 (163.0)
Driving Behaviour: Learner Licence			
Practice difficulty [2]	Difficult	7.3 (7.4)	**149.6 (148.7)****
	Neither	7.7 (11.4)	**154.6 (173.6)**
	Easy	7.1 (8.3)	**195.2 (161.2)**
Duration [3]	12-14 months	7.7 (9.7)	**186.3 (157.6)***
	14-24 months	7.3 (8.5)	**167.8 (171.2)**
	>24 months	5.7 (5.7)	**125.9 (153.4)**
Logbook hours [3]	100-110 hours	7.0 (8.9)	169.1 (160.1)
	>110 hours	8.7 (11.5)	195.7 (172.7)
Logbook accuracy [1]	Accurate	7.3 (8.9)	170.4 (156.5)
	Inaccurate	7.9 (9.9)	182.0 (176.6)
Unsupervised Learner [1]		7.2 (8.9)	206.2 (151.2)
	No	7.4 (9.0)	171.4 (164.0)
Crash [1]	Yes	11.0 (14.1)	134.6 (144.2)
	No	7.3 (8.8)	174.3 (160.8)
Offence [1]	Yes	5.5 (4.5)	**304.2 (153.2)***
	No	7.4 (9.1)	**170.1 (159.1)**
Driving Behaviour: Provisional Licence			
'Talk way out of' ticket [1]		7.9 (5.6)	**344.3 (225.0)****
	No	7.4 (9.2)	**166.8 (154.2)**

Table 12.3 (Continued)

Key Measure		Duration (hrs) *M (SD)*	Distance (km) *M (SD)*
Parent 'took punishment' [1]		**10.3 (4.6)****	194.4 (114.0)
	No	**7.3 (9.1)**	175.3 (165.5)
Crash [1]	Yes	8.8 (10.9)	193.2 (165.2)
	No	7.2 (8.8)	173.7 (163.6)
Offence [1]	Yes	**11.2 (11.3)*****	**241.6 (172.3)****
	No	**16.9 (8.5)**	**164.6 (156.9)**

Note: Significant differences evaluated at the level of .05 have been highlighted in bold for ease of reference. Sociodemographic characteristics were self-reported in Survey 2 (Provisional survey). – = not applicable. * $p < .05$, ** $p < .01$, *** $p < .001$. Analyses utilised Kruskal-Wallis tests.

a car as a Provisional driver. Provisional drivers with a car reported a shorter Learner duration and more hours recorded in their Learner logbook, suggesting that the novice and/or their parents were highly motivated to progress from the Learner licence to a Provisional licence, and vehicle ownership may have been fundamental to this process. Again, the availability of the 'spare' family car may have been influential. Graduated licensing programs such as Queensland's enhanced GDL program do not consider car ownership and the nature of young novice driver exposure, and the results suggest that vehicle ownership and driving exposure warrant further consideration.

Young novice drivers need to gain as much on-road driving experience as possible; however this exposure also places the novice at risk on the road (Williams et al., 2006). In addition, some types of exposure are more inherently risky than others, such as driving at night on the weekend, and the participants who owned their car had undertaken more driving in these conditions. Moreover, travelling as a passenger of a young novice driver also places the young person at risk. Both young novice drivers and their parents need to be educated regarding the increased risk associated with intermediate driving exposure and vehicle ownership, and where possible the newly-licensed novice should be encouraged to share a family vehicle rather than have a car for their exclusive access (Garcia-Espana et al., 2009). Also, the family car may be a safer vehicle than the kind of vehicle they could afford to purchase themselves (Williams et al., 2006). In addition, the role of the young novice in the family frequently changes upon licensure, with broader responsibilities including driving (Best, 2006). Parents of young novice drivers should be encouraged to continue monitoring their child's driving after licensure, and in

particular the nature and extent of the novice's driving exposure in the early stages of intermediate driving.

The research findings suggest that paying attention to police presence appears to be normative for young novice drivers. As a consequence, novices report they were less risky drivers in general. In contrast, some novices reported they became 'smarter' by temporarily reducing the riskiness of their behaviour within the vicinity of the Police presence only, or by avoiding these areas altogether (Scott-Parker et al., 2011b). Whilst most novices in this study reported paying attention to Police presence, the small proportion of novices who reported actually avoiding Police presence appeared to be more risky drivers in general, which is consistent with prior research (Fleiter & Watson, 2005). The study findings suggest that parents and friends play a pivotal role in providing information regarding Police presence. Parents and friends should be encouraged to not provide this information so that the novice is a less risky driver in general. Rather than facilitating young novice driver's risky behaviour by providing information about Police presence, parents and friends should encourage compliance with speed limits at *all* times as the novice can never be completely certain that the Police will not be conducting an enforcement program on the roads they are travelling. Parents and friends should also discourage 'smarter risky behaviour', for example the circumstance where the novice avoids the Police and participates in street racing when they know that the Police are already engaged in enforcement activities in another area (Scott-Parker et al., 2011b). In addition, parents are also the supervisors of Learners, and in this supervisory position they should not encourage nor support the Learner avoiding the Police whilst they are supervising. Facebook sites which alert drivers to the location of speed enforcement and random breath testing operations are controversial: the increased awareness is expected to result in desirable behaviour change of less speeding and less drink driving, however drivers who speed and drink drive may avoid these locations to avoid detection and come to rely on this as a means of breaking road rules with impunity.

The longitudinal analysis suggests that the traits of sensation seeking propensity and reward sensitivity, and the psychological states of anxiety and depression, do not influence vehicle ownership; rather ownership of a vehicle appears to allow these risky traits and states to influence the behaviour of the young Provisional driver. It appears that the greater sensitivity to reward is evidenced as

punishment avoidance for the young novice driver, and further research should examine this phenomenon. Further research should also identify *when* the novice obtained their vehicle to determine if heretofore unrecognised temporal variables moderate these influences.

Future research should also explore the day of the week, the purpose of the journey, the duration and mileage of the journey, and the passenger carrying characteristics of the young Provisional driver during the first six months of independent driving. The reasons for vehicle ownership could also be investigated. Recent research in Iceland suggests that journey logistics such as ease of travel and poor public transport alternatives, and psychosocial influences such as autonomy and self-identity are important (Collin-Lange & Benediktsson, 2010). Young novice drivers have also been found to own smaller, older cars which have less safety features in the event of a crash (Williams et al., 2006), and future research could investigate the characteristics of both the cars that novices have shared and those that they have exclusive access to, including how and when they obtained their 'own car'.

While the longitudinal nature of this research provides important insights into the behaviour of novice drivers, the research has a number of limitations which need to be borne in mind when interpreting the results. The surveys relied upon self-report data (however anonymity was likely to ameliorate any impression management concerns). As noted earlier, exposure estimates are likely to have been underestimates. There was an unusually high rate of attrition over the six month period of the research, with a greater proportion of female participants and those participants who were studying more likely to complete both surveys. Queensland experienced an unseasonably wet summer which culminated in 99% of the state being declared a disaster area (AAP, 2011) which was characterised by widespread and sometimes long-term loss of access to electricity, and therefore the email and internet access necessary for the surveys. The attrition resulted in the final sample being 70% female, and separate gender analyses were undertaken to mitigate the effects of this gender bias (with no gender differences).

A considerable proportion of the youngest most inexperienced drivers have their own car. Having a car was associated with risky behaviours such as greater driving exposure and higher rates of offences and crashes as a young Provisional driver. In addition, it appears normative for young novice drivers to pay attention to

Police presence. Moreover a quarter of young male novice drivers actively avoided this Police presence. Further investigation of car ownership, exposure, attention and avoidance is required, and GDL programs including parent and novice driver education should consider the risky driving and punishment avoidance strategies and experiences of the young novice driver when they own their own car.

12.7 Chapter summary

Chapter Twelve examined the role of mileage, car ownership, experience of punishment avoidance and the self-reported risky behaviour of young novice drivers. In addition, the chapter highlighted a number of countermeasures targeting novice drives and their parents, such as delaying car ownership by the novice and continued monitoring of the driving of the young novice in the earliest stages of independent licensure. The self-reported risky driving behaviour of the young novice drivers has been extensively investigated in this and the previous five chapters. The focus of the research program now shifts to the further understanding the person-related and environment-related influences upon the risky behaviour of young novice drivers.

Chapter Thirteen: A Further Exploration of Sensation Seeking Propensity, Reward Sensitivity, Depression, Anxiety and the Risky Behaviour of Young Novice Drivers in a Structural Equation Model

13.1 Notes

Taken from:

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). A further exploration of sensation seeking propensity, reward sensitivity, depression, anxiety and the risky behaviour of young novice drivers in a structural equation model. *Accident Analysis and Prevention.* doi:10.1016/j.aap.2012.05.027

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, arguments and hypotheses, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online surveys and the analysis of the data collected. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

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This paper, Paper Nine, uses structural equation modeling to examine the longitudinal impact of the *person*'s psychological traits of sensation seeking propensity and reward sensitivity, and the psychological states of anxiety and depression, upon the risky *behaviour* of young novice drivers. The stability of the psychogical states and traits over the six month follow-up period is also examined, and all analyses incorporated separate gender analyses. As such, the paper builds

upon the findings of Paper Three and is pivotal in understanding the nature and mechanisms of the influence of these key individual characteristics.

13.2 Abstract

Young novice drivers constitute a major public health concern due to the number of crashes in which they are involved, and the resultant injuries and fatalities. Previous research suggests psychological traits (reward sensitivity, sensation seeking propensity), and psychological states (anxiety, depression) influence their risky behaviour. The relationships between gender, anxiety, depression, reward sensitivity, sensation seeking propensity and risky driving are explored. Participants (390 intermediate drivers, 17-25 years) completed two online surveys at a six month interval. Surveys comprised sociodemographics, Brief Sensation Seeking Scale, Kessler's Psychological Distress Scale, an abridged Sensitivity to Reward Questionnaire, and risky driving behaviour was measured by the Behaviour of Young Novice Drivers Scale. Structural equation modelling revealed anxiety, reward sensitivity and sensation seeking propensity predicted risky driving. Gender was a moderator, with only reward sensitivity predicting risky driving for males. Future interventions which consider the role of rewards, sensation seeking, and mental health may contribute to improved road safety for younger and older road users alike.

13.3 Introduction

13.3.1 The young novice driver

Novice drivers in motorised countries are typically the youngest drivers, and they have a disproportionately high rate of involvement in road crashes. This phenomenon has persisted throughout Australia even in the context of steadily-reducing crash rates for all drivers. To illustrate, Australian road fatalities among drivers aged 17-25 years represented 11.4 deaths per 100, 000 population in 1990. This almost halved to 6.3 deaths per 100, 000 population in 2009. In contrast, older drivers aged 40-59 years contributed 4.1 deaths per 100,000 population in 1990, reducing to 3.5 deaths per 100,000 population in 2009 (DITRDLG, 2010). Notwithstanding these improvements, persons aged 17-24 years comprised 13.0% of the licensed driving population in Queensland, Australia, in 2010; however, they represented 23.0% of the state's road toll (DTMR, 2011c).

Young novices also place themselves at risk through their driving behaviour, including driving at night, driving on the weekend (Doherty et al., 1998), and exceeding speed limits (Yannis et al., 2007). A range of young novice driver attributes increase their risk of injury or death from a road crash. These include physiological characteristics (e.g. an underdeveloped brain; Steinberg, 2008); an underestimation of risks (Weinstein, 1980); and underdeveloped hazard perception skills (Lee et al., 2008). Young novices also have increased sensation seeking propensity (Jonah, 1997), and their driving behaviour is vulnerable to the influences of their friends and their parents (Scott-Parker et al., 2009a, 2012a). Of interest to the current research is the influence of the psychological states and traits of young novice drivers, specifically the increased risky driving associated with psychological distress, sensation seeking propensity and reward sensitivity (Scott-Parker et al., 2012c).

13.3.2 The psychosocial characteristics of the young novice driver

To better understand the risky behaviour which contributes to the crash involvement and offences of young novice drivers, road safety researchers have begun to consider the nature and breadth of psychosocial characteristics including their personality traits. Risky behaviour is associated with the psychological distress of the young novice driver; with greater anxiety and depression being associated with more self-reported risky driving (Scott-Parker et al., 2011a). Depression can

also predict future drink driving in repeat-drink-driving offenders (Hubicka et al., 2010). Risky behaviour has been associated with sensation seeking propensity; greater sensation seeking propensity corresponding to more self-reported risky driving (e.g., Jonah, 1997; Scott-Parker et al., 2009a). Anxiety has also been associated with sensation seeking propensity and risky driving (Oltedal & Rundmo, 2006). Moreover, risky behaviour has also been associated with sensitivity to reward and sensitivity to punishment; greater reward sensitivity corresponding to more hazardous drinking (Loxton & Dawe, 2006) and self-reported risky driving (Scott-Parker et al., 2012c); and individuals with greater sensitivity to reward and less sensitivity to punishment more likely to report marijuana use (Simons & Arens, 2007).

Scott-Parker et al. (2012c) first recognised the potential mediating relationships amongst the psychological states of anxiety and depression, and the trait of punishment sensitivity; and amongst the psychological traits of reward sensitivity and sensation seeking propensity. To illustrate, anxiety and depression have high comorbidity and are particularly prevalent during the adolescent period. Simulator-based research revealed that drivers with greater anxiety drive more cautiously (Stephens & Groeger, 2009), and individuals reporting more marijuana use also exhibit less sensitivity to punishment (Simons & Arens, 2007). Therefore the Authors suspected a mediation relationship amongst these traits and states. Similarly, the literature consistently reports more risky behaviour is performed by those individuals with greater sensation seeking propensity and reward sensitivity, suggesting that the two constructs may be measuring the same construct, and accordingly the Authors suspected a mediation relationship amongst these states.

Scott-Parker et al. (2012c) explored the potential mediation relationships in greater details using the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) (Torrubia et al., 2001), Kessler's Psychological Distress Scale (K10) (Kessler and Mroczek, 1994, cited in Andrews and Slade, 2001), the Impulsive Sensation Seeking Scale (ISSS) (Zuckerman et al., 1993), and the Behaviours of Young Novice Drivers Scale (BYNDS) (Scott-Parker et al., 2010). This was the first exploration of these mediating relationships, and the following relationships were found: sensitivity to punishment was found to be mediated by depression and anxiety; and reward sensitivity and sensation seeking propensity were found to be separate, yet-related constructs.

Accordingly a full path model which incorporated the co-varying depression and anxiety, and the co-varying reward sensitivity and sensation seeking propensity, was used to predict the self-reported risky behaviour of the young novice driver. Depression, reward sensitivity, sensation seeking propensity and anxiety explained a significant 24% of variance in the self-reported risky driving by the young novice driver. The important role of driver gender was also recognised in their research, and moderation analyses using the simplest approach of replicating the path model for each gender found that gender was a moderator: whilst depression, reward sensitivity, and sensation seeking propensity were influential for males, anxiety was also influential for females. Reward sensitivity was twice as influential for females as for males, whilst depression was twice as relevant for males as for females. Sensation seeking propensity exerted a similar influence for both genders. The path models explained 21% and 27% of variance in the risky driving behaviour of young male and female novice drivers, respectively.

The research of Scott-Parker et al. (2012c) was cross-sectional in nature, however. Considering the pervasive influence of the psychological traits/states of reward sensitivity, sensation seeking propensity, depression, and anxiety, longitudinal research is required to more fully understand their influence on self-reported risky driving. In addition, the stability of these constructs in the adolescent young novice driver merits further exploration.

13.3.3 Research aims

This study explores the self-reported risky driving behaviour of the young novice within the context of their reward sensitivity, sensation seeking propensity, depression, and anxiety in a longitudinal methodology. Previous research revealed the influence of these constructs is moderated by gender, and developmental considerations may be a factor. Accordingly a structural equation model based upon the research findings of Scott-Parker et al. (2012c) incorporating two sequential measures of reward sensitivity, sensation seeking propensity, depression, and anxiety is tested. Separate tests were conducted for each gender. The stability of reward sensitivity, sensation seeking propensity, depression, and anxiety is also examined, including separate gender analyses. Understanding the relationships between reward sensitivity, sensation seeking propensity, depression, and anxiety may reveal additional avenues for intervention in road safety, and in particular the longitudinal

investigation may provide heretofore unrealised insights into the development and operationalisation of these constructs.

13.4 Method

13.4.1 Participants

Drivers (n = 1170, 461 males) aged 17-25 years (M = 17.90, SD = 1.51, Mode, Median = 17) volunteered to complete the 30-minute Learner Survey (Survey 1). Six months later, 390 of these novice drivers (113 males) aged 17-25 years (M = 18.23, SD = 1.58, Mode = 17, Median = 18) completed the 30-minute Provisional Survey (Survey 2). The analyses were conducted using the responses of these 390 participants only. The sample size exceeded the ratio of 20 participants to each variable required for structural equation modelling (Kline, 2011).

13.4.2 Measures

Participants reported age and gender, completed the binary 11-item abridged Sensitivity to Reward Questionnaire[5] (SRQ) (*yes*, *no*) (Time 1: skewness = .50, kurtosis = -.28; Time 2: skewness = .53, kurtosis = -.28), and responded to the 5-point Likert scales of the K10 (1 *none of the time* to 5 *all of the time*) which was subsequently divided into depression (K10-depression; Time 1: skewness = 1.34, kurtosis = -2.04; Time 2: skewness = 1.37, kurtosis = 1.69) and anxiety (K10-anxiety; Time 1: skewness = 1.20, kurtosis = 1.89; Time 2: skewness = 1.03, kurtosis = .74) subscales, and the 8-item Brief Sensation Seeking Scale (BSSS)[6] (Hoyle et al., 2002) (1 *strongly disagree* to 5 *strongly agree*) (Time 1: skewness = .02, kurtosis = -.40; Time 2: skewness = -.04, kurtosis = .12). Both surveys incorporated the 44-item Behaviour of Young Novice Drivers Scale (BYNDS) (Scott-Parker et al., 2010) (1 *never* to 5 *almost always*) (Time 2: skewness = .96, kurtosis = 1.19). Items in scales

[5] In the interests of brevity and to address psychometric problems such as low factor loadings (e.g., Li et al., 2007) identified in applications of the SPSRQ, preliminary research refined an abridged version of the Sensitivity to Reward Questionnaire. Three separate exploratory factor analyses which retained only items loading above .40 for all three groups were conducted: the total sample, the male participants only, and the female participants only. The participants were 476 drivers (238 males) aged 17-25 years (M = 19.0, SD = 1.59) with a Provisional licence who attended 1 of the 13 major tertiary institutions across Queensland; matched for age, gender and tertiary institution. The Abridged SRQ correlated very highly with the original SRQ (r = .90).

[6] In the preliminary research, the predictive ability of the BSSS and the ISSS were also compared through hierarchical multiple regressions which alternated the steps in which each scale was entered into the equations. In the interests of brevity, and as the scales were highly correlated (r = .84) and accounted for almost the same amount of variance in self-reported risky driving (BSSS ΔR^2 = .152, ISSS ΔR^2 = .166), the shorter BSSS was incorporated in the larger research project.

were summed and analyses used composite scores for each instrument. Higher SRQ, BSSS, and K10 scores indicate greater reward sensitivity, sensation seeking propensity, anxiety and depression respectively; higher BYNDS scores indicate more self-reported risky driving.

13.4.3 Procedure and design

Surveys were cross-sectional; however the data in the longitudinal project comprised repeated measures. Every Learner driver in Queensland, Australia, who passed their practical driving assessment 1 April through 30 June 2010 was invited to participate. Incentives were the chance to win petrol vouchers (Survey 1 and 2), and movie tickets (Survey 2). The overall response rate for Survey 1 was 14.4% (n = 1333, 9 393 reminder letters were mailed to novices of all ages). The response rate for novices aged 17-25 years could not be calculated due to privacy restrictions preventing access to the ages of novices who did not participate. There was 66.7% attrition; however both surveys were representative of the Queensland population: 62.2% of the Survey 2 participants resided in major cities and 1.6% resided in remote regions, and 60.0% of Queensland's population resided in major cities and 2.0% resided in remote regions (Australian Bureau of Statistics, 2010).

13.4.4 Statistical analyses

Measures of internal consistency utilised Cronbach's alpha (α). Bivariate correlations explored the strength of associations between study variables. Means were compared using analysis of variance (ANOVA) and paired t-tests. The online survey was created in KeySurvey Enterprise Online Survey Software. Analyses were conducted using AMOS and PASW version 18.0.

13.5 Results

13.5.1 Descriptive analyses, comparison of means

The Learner (herein 'Time 1') drivers reported moderate levels of sensation seeking propensity (BSSS range 8-40), reward sensitivity (SRQ range 0-11), depression (K10-depression range 6-30), and anxiety (K10-anxiety range 4-20) (Table 13.1). The Provisional (herein 'Time 2') drivers reported moderate levels of risky driving (BYNDS range = 44-134), sensation seeking propensity (BSSS range 8-40), reward sensitivity (SRQ range 0-11), depression (K10-depression range 6-27),

and anxiety (K10-anxiety range 4-16). There were no significant differences in depression and anxiety between the two times (average period six months). There was a significant difference for sensation seeking propensity ($p < .01$) and reward sensitivity ($p < .001$), with Time 2 drivers reporting greater sensation seeking propensity and lower reward sensitivity.

Males reported greater reward sensitivity and sensation seeking propensity, whilst females reported more depression and anxiety at each time (Table 13.1). There was a significant gender difference for anxiety, Time 1 males ($p < .01$) and Time 2 males ($p < .05$) reported significantly less anxiety than Time 1 and Time 2 females. ANOVA also revealed a significant difference for sensation seeking propensity and reward sensitivity, with Time 1 ($p < .001$, $p < .01$ respectively) and Time 2 males ($p < .01$, $p < .001$) reporting significantly greater sensation seeking propensity and reward sensitivity. There were no significant differences on any of the measures of males for the two time points. For females there was a significant difference in sensation seeking propensity ($p < .01$) and reward sensitivity ($p < .001$), Time 1 females reporting lower sensation seeking propensity and greater reward sensitivity than Time 2 females. Differences in depression and anxiety between each time point were non-significant.

Reward sensitivity was strongly associated with sensation seeking propensity (higher reward sensitivity associated with higher sensation seeking propensity at Time 1 and Time 2), and reward sensitivity and sensation seeking propensity (both time points) were strongly associated with more self-reported risky driving behaviour (Table 13.2). Greater depression was associated with greater anxiety at both time points. Provisional anxiety and depression were moderately associated with greater self-reported risky driving behaviour, whilst the relationship between Time 1 anxiety and depression and risky driving was significant but weak.

For female young novice drivers Time 1 reward sensitivity and Time 2 reward sensitivity were positively associated with Time 2 depression; and Time 2 sensation seeking propensity was associated with Time 2 anxiety and Time 2 depression. For males, Time 1 anxiety and Time 1 depression were significantly associated with Time 2 sensation seeking propensity. In addition, whilst significant for both genders, the positive relationship between reward sensitivity and sensation seeking propensity at both times, and risky driving (BYNDS), was stronger for females than males. Figure 13.1 depicts the correlations coefficients for which the

Table 13.1 Means and standard deviations for all scales for the young novice drivers (N = 390), and separately for the male (N = 113) and female (N = 277) drivers

		Time 1							Time 2					
				Males		Females					Males		Females	
Scale	**α**	***M***	***SD***	***M***	***SD***	***M***	***SD***	**α**	***M***	***SD***	***M***	***SD***	***M***	***SD***
SRQ	.72	**3.8**	**2.7**	*4.4*	*2.7*	***3.6***	***2.5***	.73	**3.4**	**2.4**	*4.1*	*2.6*	***3.1***	***2.2***
BSSS	.83	**22.0**	**6.5**	*23.8*	*6.5*	***21.2***	***6.3***	.80	**22.8**	**6.6**	*24.4*	*6.5*	***22.1***	***6.6***
ANX	.77	7.2	2.6	*6.6*	*2.6*	*7.4*	*2.5*	.75	7.0	2.7	*6.5*	*2.3*	*7.2*	*2.8*
DEP	.89	10.4	4.1	9.9	4.1	10.6	4.1	.87	10.4	4.4	9.7	3.9	10.6	4.5
BYNDS	_	_	_	_	_	_	_	.88	75.9	15.0	77.5	16.6	75.2	14.3

α = Cronbach's Alpha; Sk. = Skew; Kt. = Kurtosis; – = Not Applicable. Bold font indicates significant differences between surveys measured by paired-sample t-tests. Italic font indicates significant differences between genders measured by ANOVA. SRQ = Abridged Sensitivity to Reward Questionnaire; BSSS = Brief Sensation Seeking Scale; DEP = Depression subscale of Kessler's Psychological Distress Scale; ANX = Anxiety subscale of Kessler's Psychological Distress Scale; BYNDS = Behaviour of Young Novice Drivers Scale.

Table 13.2 Correlations between young novice driver gender, sensitivity to reward, personal propensity for sensation seeking, anxiety, depression, and self-reported risky driving behaviour

Key Measure	Gender	L SR	L PPSS	L ANX	L DEP	P SR	P PPSS	P ANX	P DEP
Gender	_								
L SR	-.15**	_							
L PPSS	-.18***	.42***	_						
L ANX	.13**	.21***	.14**	_					
L DEP	.07	.22***	.10	.61***	_				
P SR	-.20***	.65***	.40***	.21***	.19***	_			
P PPSS	-.16**	.33***	.64***	.11*	.10	.49***	_		
P ANX	.12*	.18**	.16**	.49***	.38***	.15**	.15**	_	
P DEP	.10	.12*	.05	.32***	.52***	.08	.08	.59***	_
P BYNDS	-.07	.30***	.37***	.15**	.13**	.44***	.40***	.24***	.21***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. L = Learner; P = Provisional Driver. Bivariate correlations between continuous variables utilised Pearson's product moment correlation *(r)*. Bivariate correlations between continuous and dichotomous variables utilised point biserial correlations *(r_{pb})*. See Table 13.1 for construct definitions.

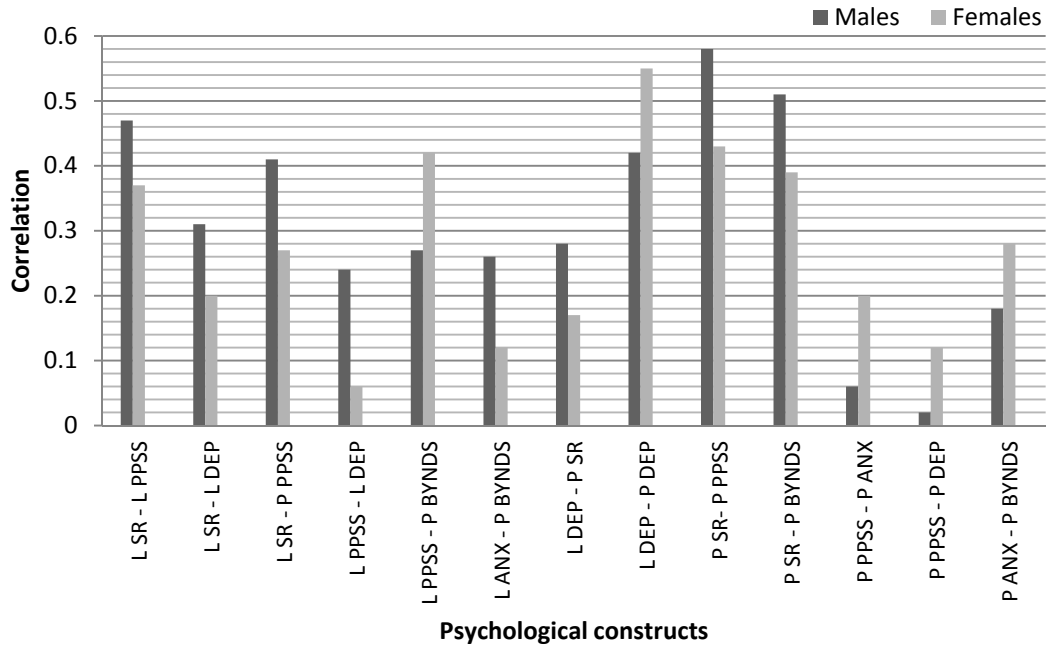
genders differ by ≥ .10.

13.5.2 Structural equation modeling

The variables demonstrated univariate and multivariate normality (skew < 2, kurtosis < 7), therefore structural equation modelling (SEM) used maximum likelihood estimation to estimate the parameters of the model. Good model fit was determined by a combination of likelihood ratio chi-square statistic (χ^2 non-significant or < 3 times the degrees of freedom), Bentler's Comparative Fit Index (CFI ≥ .95), the Steiger-Lind Root Mean Square Error of Approximation (RMSEA ≤ .08) including 90% confidence intervals (Kline, 2011), the Tucker-Lewis Index (TLI ≥ .95). The cross-sectional path diagram of Scott-Parker et al. (2012c) was the base model, and Time 1 and Time 2 variables were integrated (Figure 13.1).

Time 1 variables were presumed to inform corresponding Time 2 variables, the Time 2 variables predicting the intermediate drivers' risky behaviour. This model was a good fit, χ^2 (18, N = 390) = 49.52, $p < .01$, CFI = .98, TLI = .96, RMSEA = .06 [.04-.08] and explained 24% of variance in self-reported risky driving (Figure 13.1). Structural paths significant at $p < .05$ were positive and revealed risky driving was

Figure 13.1 Correlations between psychological constructs and risky driving behaviours according to gender (for correlations where the difference in the correlation coefficients between the genders is ≥ .10)



predicted by the Time 2 driver's sensation seeking propensity, reward sensitivity, and anxiety, with greater sensation seeking propensity, reward sensitivity and anxiety associated with more risky driving.

13.5.3 Moderation analyses

The separate gender analyses revealed interesting differences in the contribution of the model variables to self-reported risky driving (Figure 13.2). The model for males had a good fit to the data, χ^2 (22, N = 113) = 30.57, p = .11, CFI = .98, TLI = .96, RMSEA = .06 [.00- .11] and explained 27% of variance. The only significant predictor was SR, with greater SR associated with more risky driving behaviour. The model for the female young novice drivers was also a good fit, χ^2 (22, N = 277) = 54.95, p < .001, CFI = .96, TLI = .94, RMSEA = .07 [.05-.10] and explained 23% of variance. The significant predictors were PPSS, SR, and ANX, with greater PPSS, SR, and ANX associated with more risky driving behaviour.

13.6 Discussion

A longitudinal exploration of the stability of reward sensitivity, sensation

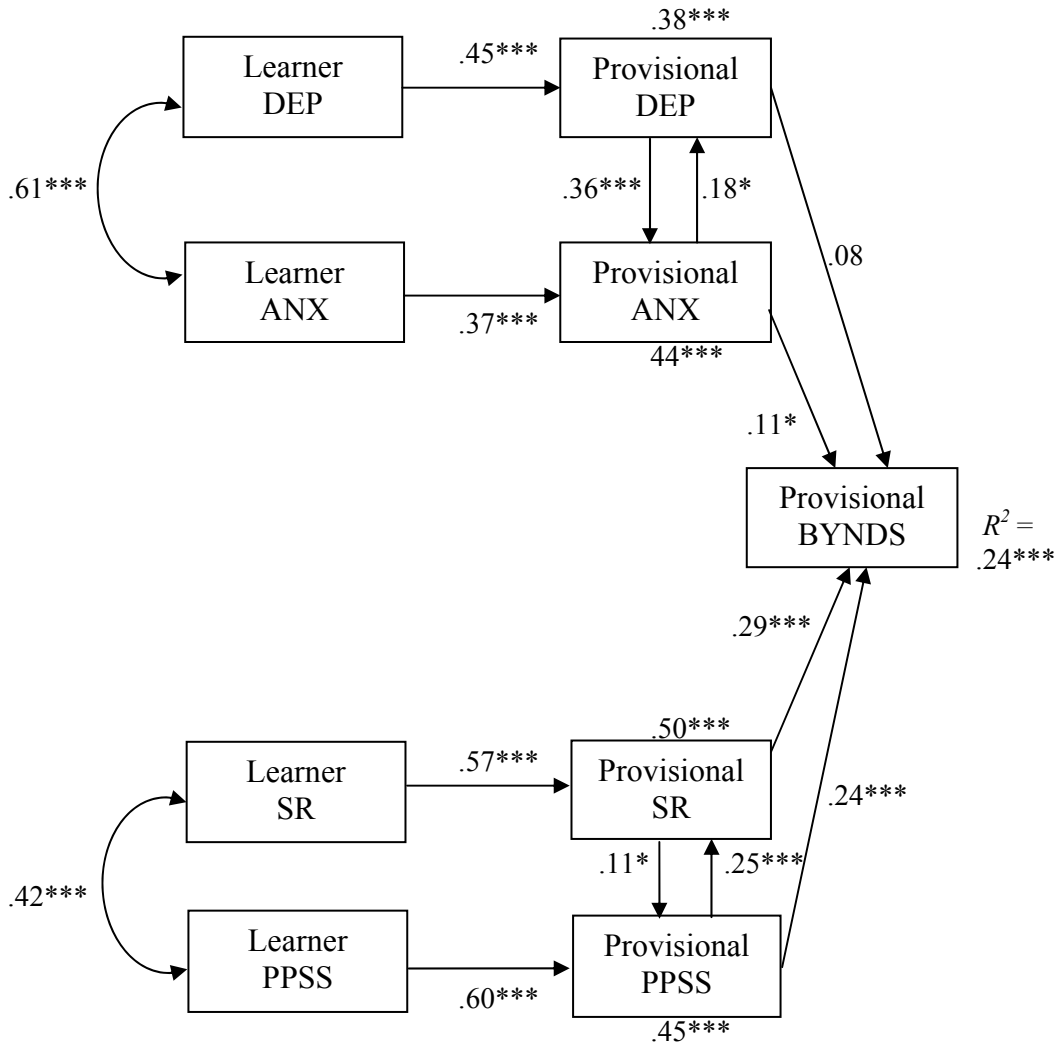


Figure 13.2 The longitudinal structural equation model for sensitivity to reward, anxiety and depression, personal propensity for sensation seeking and self-reported risky driving behaviour

Note: * $p < .05$, *** $p < .001$. Goodness of fit: χ^2 (22, N = 390) = 49.52, $p < .01$, CFI = .98, TLI = .96, RMSEA = .06 [.04- .08]. See Table 13.1 for construct definitions.

seeking propensity, anxiety and depression as indicated by the scores obtained on the Abridged SRQ, the BSSS, and the K10 provided important insights into the psyche of the developing novice driver. Interestingly the experienced of the psychological states of depression and anxiety remained relatively stable throughout this time, further evidenced by the correlations between the Time 1 and Time 2 measures. In contrast, psychological traits – also correlated between the Time 1 and 2 measures, and frequently presumed to be stable – appeared to change over the follow-up period, with the novice drivers becoming significantly less sensitive to rewards and exhibiting significantly greater sensation seeking propensity over this time. Whilst

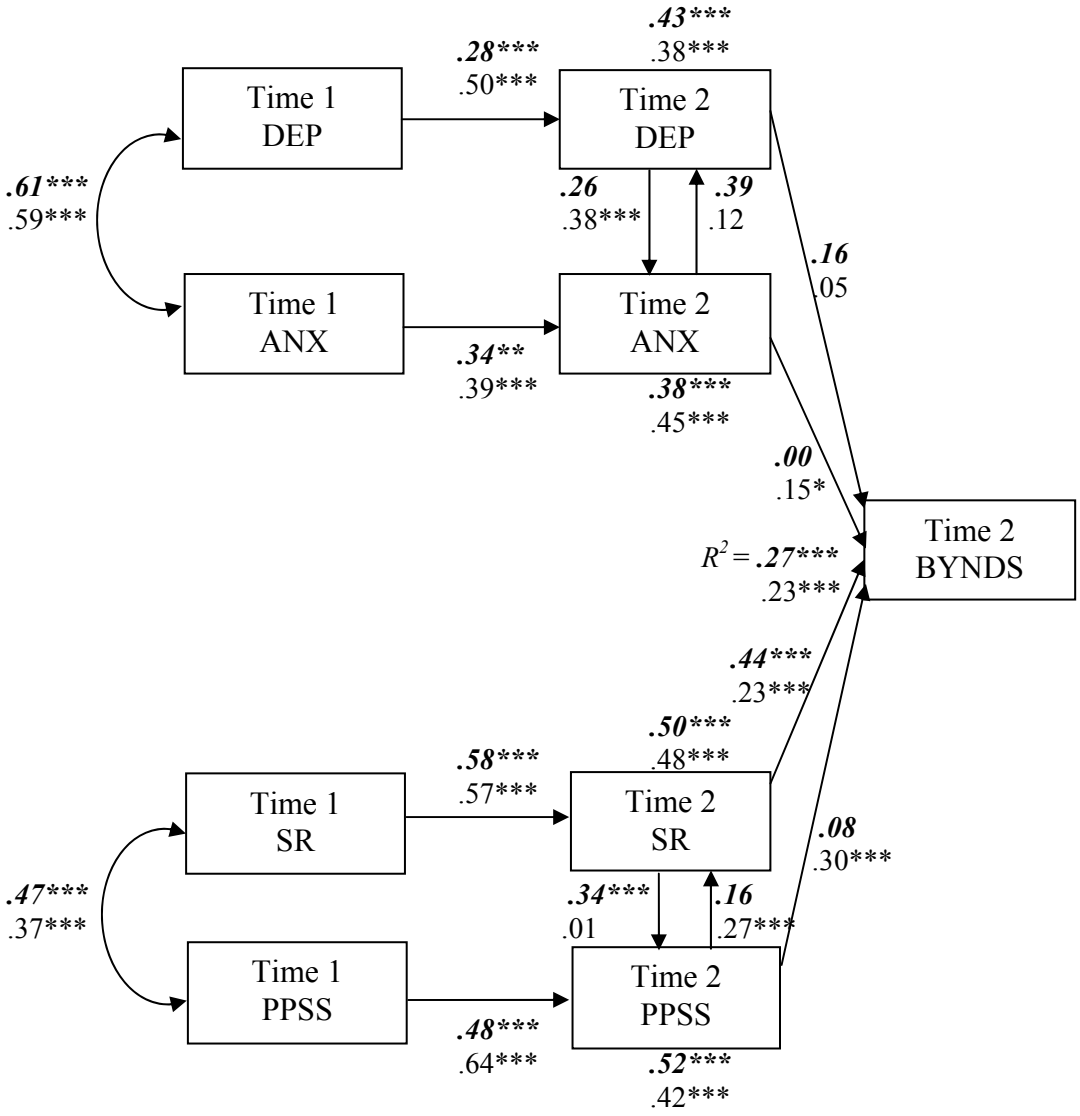


Figure 13.3 Structural equation models illustrating the moderation by gender of the self-reported risky driving behaviour of young novice drivers (male coefficients shown in bold italic font)

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. See Table 13.1 for construct definitions.

such fluctuation may be due to psychosocial and physiological maturation of the adolescent novice driver, further research is required to determine the causes and moderators of this instability.

This finding is of particular concern to road safety researchers, because the Provisional driver is able to drive unsupervised and may drive in a manner that may be motivated by their sensation seeking propensity. Females reported significantly greater anxiety and significantly less reward sensitivity and sensation seeking propensity than males at both measurement intervals which may be reflected in

lower rates of risky driving reported by females. The revised longitudinal model also explained substantial variance in each of the constructs except for depression, and it is unclear at this time why. As expected, there were clear relationships between the Learner psychosocial constructs and the comparable Provisional psychosocial constructs, and the quantification of these relationships through the present longitudinal research is also informative. To illustrate, an increase of 1 *SD* in Learner reward sensitivity would predict an increase of .6 *SD* in Provisional reward sensitivity.

The non-contribution of depression in the current research requires further reflection, particularly when these findings are in stark contrast to that of Scott-Parker et al. (2012c). Both the Time 1 and Time 2 drivers in Study 2 reported lower depression than those in the prior research (M = 11.84, SD = 4.86). Scott-Parker et al. also reported significant correlations between depression and gender, depression and reward sensitivity, and depression and sensation seeking propensity; however these findings were not replicated in the current research. In addition, anxiety levels of participants in the current research were also lower than that of the earlier research (M = 7.63, SD = 2.69). Interestingly the same gender patterns emerge in each study, with females consistently reporting greater anxiety and depression. Whilst the differences in the research findings between the two studies may be due to selection bias, the findings may instead suggest that young tertiary students in Queensland experience greater depression and anxiety which may have implications for tertiary education providers who need to be aware their students may be at greater risk of mental health difficulties. Tertiary students were also riskier drivers than the general young novice driver population (M = 84.67, SD = 20.44; Scott-Parker et al., 2012c), reinforcing the need for targeted interventions.

The results have implications for mental health practitioners, medical professionals, and road safety researchers alike. Psychological distress is a predictor of risky driving, and the longitudinal research has begun to elucidate the separate influence(s) of depression and anxiety. Young novice drivers, and females in particular, who are experiencing anxiety are at increased risk of injury from a car crash. In addition, depression was also found to place the young female novice driver at greater risk. Mental health practitioners counselling young persons experiencing anxiety and depression who have a driver's licence should be aware of the increased risk of injury on the road. Medical professionals treating young persons with a

driver's licence who have been injured through engagement in risky behaviour – including risky driving – should be aware the novice may also be experiencing mental health issues. Interventions designed to ameliorate depression and anxiety are likely to have broader benefits, such as improved road safety for young and older road users alike. Further research is required, however, to provide an understanding of *why* the depressed and/or anxious novice drives in a different, more risky, manner, and this can also inform the development and evaluation of mental health and road safety countermeasures.

Furthermore, the young persons' sensation seeking propensity and reward sensitivity may have contributed to their participating in the risky behaviour, including risky driving. Interventions designed to counter risky behaviour by young novice drivers – such as the graduated driver licensing legislation introduced in Queensland in July 2007 – frequently rely upon the threat and administration of punitive measures to curtail such behaviour. However this study suggests that the risky driving of the young novice driver was influenced by their sensation seeking propensity and reward sensitivity. Therefore an intervention that takes into account young drivers' sensation seeking propensity and reward sensitivity may be more effective in reducing risky behaviour. In addition, rather than generic interventions, gender-specific programs which also consider the separate influences of anxiety, depression, sensation seeking propensity and reward sensitivity could be more efficacious in reducing risky driving.

This was the second study to explore the link between anxiety, depression, sensation seeking propensity and reward sensitivity in relation to the self-reported risky behaviour of young novice drivers, and the first to incorporate a longitudinal methodology. SEM for each gender suggested that the nature of the influence of these psychosocial constructs is not straightforward. Not only should research examining the breadth and depth of various influences upon young novice driver behaviour incorporate separate analyses by gender, but interventions similarly may need to consider the gender of the young novice driver. In addition, the study again divided the nature of psychological distress as measured by the K10 according to the separate subscales of anxiety and depression. This allowed a further delineation of the influence of these mental health variables that have been found to be predictive of risky driving behaviour.

Online research methods are advantageous because they are inexpensive, easy to use, and able to reach a large audience in a short time period (Huang, 2006). Also, young persons are more likely to be computer-literate and able to complete the simple online instrument (Knapp & Kirk, 2003). More females than males participated in each survey (52.0% of Queensland Learners were female), and therefore separate gender analyses were undertaken. The overall response rate was relatively low, and a greater proportion of Learners aged 17 years chose to participate (58.2% of the participants compared to 49.8% of Queensland's Learner population). The attrition between the two samples appears high for a follow-up survey done within a comparatively short period (six months); however 99% of Queensland was declared a disaster-zone after an exceptionally wet and windy summer (widespread flooding, cyclones) during the follow-up period (AAP, 2011). Notwithstanding the attrition and the potential introduction of biases, the sample geographically-represented the population distribution of Queensland.

This longitudinal research has allowed an exploration of the stability not only of anxiety, depression, sensation seeking propensity and reward sensitivity; but also the extent of the influence of these states and traits upon the behaviour of the young novice driver as they mature from an inexperienced novice driver to a novice with six months independent driving experience. Longitudinal research over an extended period and with a larger sample could further explore the relationships between and amongst the variables and risky driving, and the findings could be used to inform intervention development. In particular, actual driving behaviour captured via in-car recording devices or in a driving simulator, insurance-reported crashes and police-detected offences could also be incorporated in different novice driving populations in Australia and around the world. The apparent instability of the psychological traits of sensation seeking propensity and reward sensitivity should also be examined, to determine whether it reflects underlying changes in the traits or is simply a product of inadequate measurement.

In recent years, research into young novice road safety has begun to consider the psychosocial influences upon their risky driving which contributes to their persistent overrepresentation in crashes, injuries and fatalities. The relationship between anxiety, depression, sensation seeking propensity and reward sensitivity within the domain of the risky driving of the young novice had not been considered in a longitudinal methodology, and the stability of these constructs over a six month

period was considered separately for each gender. Whilst the young novice's reward sensitivity, sensation seeking propensity, and anxiety explained their risky driving behaviour, sensation seeking propensity was twice as influential, and reward sensitivity almost three times as influential, as anxiety. Whilst the influence of these variables differed considerably for males and females, it is noteworthy that the small sample of males suggests that these findings are preliminary. The larger sample of females indicates that reward sensitivity is almost as influential as sensation seeking propensity which is twice as influential as anxiety. Interventions that attempt to reduce rewards for risky driving, discourage the expression of sensation seeking propensity, and address psychological distress merit further consideration. Furthermore, attention to the gender differences in the influence of these psychosocial constructs is likely to result in more effective interventions.

13.7 Chapter summary

Chapter Thirteen reported the longitudinal exploration of the nature and mechanisms of influence of the psychological traits of sensation seeking propensity and reward sensitivity and the psychological states of depression and anxiety upon the self-reported risky behaviour of young novice drivers. In addition, the stability of the constructs over the six month period was also examined. Further, separate gender analyses were conducted. The four traits and states will be incorporated in the analyses of the next paper, which uses a theoretical framework to identify the psychosocial predictors of speeding by Provisional drivers.

Chapter Fourteen: Speeding By Young Novice Drivers: What Can Personal Characteristics and Psychosocial Theory Add to our Understanding?

14.1 Notes

Taken from:

Scott-Parker, B., Hyde, M. K., Watson, B., & King, M. J. (2012). Speeding by young novice drivers: What can personal characteristics and psychosocial theory add to our understanding? *Accident Analysis and Prevention*. doi: 10.1016/ j.aap.2012.04.010

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, arguments and hypotheses, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online survey and the analysis of the data collected. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

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The findings of the papers comprising the thesis-by-publication thus far – Chapters Five to Thirteen – have informed the research of this paper, Chapter Fourteen. This paper focuses upon two aspects pertinent to the program of research. Firstly, a measurement model of Akers' SLT is developed and tested. Then the influence of each of the constructs of Akers' SLT upon self-reported speeding is examined, including the differential influence of rewards and punishments, and definitions. Secondly, the psychosocial and sociodemographic, Akers' SLT and Gerrard and Gibbons' PWM variables are entered as separate steps in a series of

hierarchical multiple regression analyses examining the predictors of self-reported speeding as a Provisional driver. Separate gender analyses were also undertaken to further inform our understanding of the risky behaviour of young novice drivers.

14.2 Abstract

Purpose: Young novice drivers continue to be overrepresented in fatalities and injuries arising from crashes even with the introduction of countermeasures such as graduated driver licensing (GDL). Enhancing countermeasures requires a better understanding of the variables influencing risky driving. One of the most common risky behaviours performed by drivers of all ages is speeding, which is particularly risky for young novice drivers who, due to their driving inexperience, have difficulty in identifying and responding appropriately to road hazards. Psychosocial theory can improve our understanding of contributors to speeding, thereby informing countermeasure development and evaluation. This paper reports an application of Akers' social learning theory (SLT), augmented by Gerrard and Gibbons' prototype/willingness model (PWM), in addition to personal characteristics of age, gender, car ownership, and psychological traits/states of anxiety, depression, sensation seeking propensity and reward sensitivity, to examine the influences on self-reported speeding of young novice drivers with a Provisional (intermediate) licence in Queensland, Australia.

Method: Young drivers (n = 378) recruited in 2010 for longitudinal research completed two surveys containing the Behaviour of Young Novice Drivers Scale, and reported their attitudes and behaviours as pre-Licence/Learner(Survey 1) and Provisional (Survey 2) drivers andtheir sociodemographic characteristics.

Results: An Akers' measurement model was created. Hierarchical multiple regressions revealed that (1) personal characteristics (PC) explained 20.3%; (2) the combination of PC and SLT explained 41.1%; and (3) the combination of PC, SLT and PWM explained 53.7%, of variance in self-reported speeding. Whilst there appeared to be considerable shared-variance, the significant predictors in the final model included gender, car ownership, reward sensitivity, depression, personal attitudes, and Learner speeding.

Conclusions: These results highlight the capacity for psychosocial theory to improve our understanding of speeding by young novice drivers, revealing relationships between previous behaviour, attitudes, psychosocial characteristics,and speeding. The findings suggest multi-faceted countermeasures should target the risky behaviour of Learners, and Learner supervisors should be encouraged to monitor their driving speed. Novice drivers should be discouraged from developing risky attitudes towards speeding.

14.3 Introduction

14.3.1 The young novice driver

Young drivers – drivers aged 25 years or less – are frequently novices who are new to the driving experience. Although fatality rates for young drivers in Australia have reduced in recent years (declining from 28.0% to 26.2% of driver deaths between 2001 and 2010; DITRDLG, 2011), young people continue to be overrepresented in road crashes. Graduated driver licensing (GDL) programs are an effective intervention characterised by multiple stages of licensure, allowing novices to gain driving experience in less risky circumstances over an extended period. A modified GDL program was introduced in Queensland, Australia in July 2007 with requirements including 100 hours of logbook-certified practice and passenger restrictions in the Provisional 1 period[7] (Queensland Transport, 2007). The Learner stage has been found to be the safest period of driving for the young novice and the Provisional (intermediate) period the least safe. For instance, in 2010, 5.7% of the licensed Queensland driving population held a Learner licence, and represented 1.0% of drivers involved in fatal crashes. In contrast, Provisional drivers represented 5.3% of the licensed driving population with 8.6% of drivers involved in fatal crashes (DTMR, 2011b).

Speeding is arguably the most widespread risky – and illegal – behaviour for drivers in general, and for young novice drivers in particular, and can become an habitual behaviour with past speeding predicting subsequent speeding (De Pelsmacker & Janssens, 2007). Speeding contributed to 22.1% of *all* fatalities in Queensland in 2010 (DTMR, 2011b) and to 30.2% of *young driver and rider* fatalities in Queensland in the five years to 31 December 2010 (DTMR, 2011a). In a study undertaken in Victoria, Australia, young males reported driving more than 10 km/hr over the speed limit on half of their recent journeys (Vassallo et al., 2007). Speeding is of particular concern for young novice drivers due to their inexperience in detecting and responding appropriately to driving hazards.

Typically research into risky driver behaviour, including speeding, considers sources of influence on behaviour in isolation; for example, examining only the

[7] The enhanced-GDL program in Queensland incorporates two Provisional licences. The novice driver progresses from a Learner to a Provisional 1 licence which must be held for a minimum 1-year period. After passing a hazard perception test, the novice progresses from a Provisional 1 licence to a Provisional 2 licence which must be held for a minimum 2-year period (Queensland Transport, 2007a).

influence of the personal characteristics of the young novice driver, their previous behaviour, or constructs from psychosocial theory. It is fundamental, however, that road safety researchers acknowledge that a variety of factors may simultaneously influence the behaviour of the young novice driver; therefore holistic approaches which incorporate personal characteristics, social, and non-social influences need to be operationalised in attempts to understand risky behaviours such as speeding.

14.3.2 The personal characteristics of the young novice driver

Personal characteristics such as driver gender (80.9% of 17-24 year old drivers killed in Queensland in 2010 were male; DTMR, 2011a) and age (youngest drivers account for the greatest proportion of speed-related crashes at all licence levels, Lam, 2003b) are associated with increased young driver crash risk. Car ownership (e.g., Scott-Parker et al., 2011b; Williams et al., 2006) or vehicle access (e.g., Cammisa et al., 1999; Garcia-Espana et al., 2009) are also associated with risky driving including speeding. An increased likelihood of risky driving, such as speeding, has been found also for novices reporting psychological distress (anxiety/depression, Scott-Parker et al., 2011a; Sumer, 2003) and greater reward sensitivity (Scott-Parker et al., 2012c). Sensation seeking propensity is also associated with risky driving (Jonah, 1997), including self-reported (Sumer, 2003) and actual speeding (Greaves & Ellison, 2011), for male and female young novice drivers alike (Scott-Parker et al., 2012, 2012d). To further our understanding of these influences, investigations into self-reported speeding of young novice drivers should be guided by a psychosocial theoretical framework, such as Akers' social learning theory (SLT), which has the capacity to incorporate personal characteristics (e.g., sensation seeking propensity, reward sensitivity) while simultaneously considering social and non-social influences including attitudes and reinforcement.

14.3.3 Akers social learning theory and the young novice driver

Akers' SLT (Akers et al., 1979) emerged within the criminological domain and focuses on the social and non-social conditioning influences in the initiation and maintenance of delinquent behaviour. The constructs of *differential association*, *definitions*, *imitation*, and *differential reinforcement* are key in the context of the 'delinquent behaviour' of speeding by the young novice driver. *Differential association* represents the interactions between the young novice driver and

significant others and varies according to frequency, intensity, duration and priority; *definitions* encompasses attitudes and orientations and includes values and rules regarding behaviours; behaviours are primarily learned through *imitating* significant others; whilst behaviours are maintained through *differential reinforcement* by significant others, comprising rewards and punishments.

The social learning process begins for the young driver when they *differentially associate* with their parents and friends who, as similar-aged peers, are likely to be young novice drivers. For the adolescent, differential association with parents will likely be of longer duration and greater frequency, and with peers of greater priority and intensity. The behaviours and attitudes of these models are subsequently *imitated* by the young novice who also develops *attitudes* regarding speeding. These significant persons are able to *differentially reinforce* speeding performed by the young novice driver through punishment and rewards. If the young novice driver has parents and/or friends who have risky attitudes towards speeding and engage in speeding, and if these significant others reward and/or do not punish young novice driver speeding, the young novice driver will likely develop and maintain risky *attitudes* towards speeding and to speed themselves.

Akers' SLT has been applied in a variety of adolescent research, including cigarette smoking (Krohn et al., 1985) and illicit drug and alcohol use (Akers et al., 1979) and more recently in the road safety context including self-reported risky driving of young novices (Bates et al.,a 2009; Scott-Parker et al., 2009a, b), unlicensed driving (Watson, 2004), and speeding (Fleiter et al., 2006, 2010). There is contention regarding the 'order' of influence of each of Akers' constructs (e.g., Krohn, 1999), compounded by a lack of model specificity (Krohn et al., 1985). The debate centres upon Akers' suggestion that *differential association* is the primary construct to exert influence over the risky behaviour of the adolescent (Akers et al. 1979). In addition, there is controversy regarding construct independence (e.g., Amdur, 1989), and some constructs have been difficult to measure consistently (e.g., 'imitation').

High construct inter-correlations within early SLT research (e.g., Akers et al., 1979) suggest the measurement model alleged to support the structure, and therefore the explanatory ability, of the theory is incorrect. In particular, the large proportion of variance in the risky behaviour of interest explained by just one of the four constructs (differential association) has suggested to some that there is no need to

incorporate all four constructs within analyses. However, in many applications of Akers' SLT, a measurement model was not created nor tested, and redundant items or items that load upon multiple constructs may not have been identified (Amdur, 1989). Accordingly, in the current study, an initial measurement model of Akers' SLT was created prior to the inclusion of the model within the remainder of the analyses. The amount of variance explained by the constructs and their respective (sub)scales were examined also.

Qualitative research undertaken by the authors (Scott-Parker et al., 2012a) framed within Akers' SLT also revealed an interesting phenomenon pertaining to young novice driver behaviour. Young novices reported the reaction of their parents, friends, and Police – ostensibly within the *differential reinforcement* dimension – was contingent upon the outcome of the behaviour. To illustrate, young novice drivers reported friends and parents would not care if they bent[8] road rules and 'nothing bad happened', therefore there would be no punitive consequences. However, if the young novice bent road rules and 'something bad happened' – such as a crash or a traffic citation – they anticipated considerable negative consequences from parents and friends. Accordingly an additional reinforcement schedule measuring this phenomenon utilising a 'probability' response format (Akers, 2009) is incorporated within the present research.

Akers' SLT explains more variance in risky driving behaviour when compared to other theories such as deterrence theory (e.g., Fleiter et al., 2006) and captures constructs incorporated within other theories such as social identity theory (Scott-Parker et al., 2009a). Akers' SLT can be augmented also by elements of other psychosocial theories (Elliott & Thomson, 2010; Horvath et al., 2012). In particular, the prototype/willingness model (PWM, Gibbons & Gerrard, 1995), which considers not only the attitudes of the young adult but also *prior behaviour, intentions* and situational *willingness* as influences on risky behaviour, represents a potentially useful perspective with which to augment Akers' SLT.

[8] Pilot research undertaken with young novice drivers (preliminary small group interviews, unpublished, which informed the research of Scott-Parker et al., 2009a, b) explored the perception of transgressions of road rules by young novice drivers. Young novice drivers reported that 'minor' transgressions, such as speeding by 5 kilometres per hour, illegal U-turns, and texting whilst driving were only 'bending' the road rules, whilst in contrast 'major' transgressions, such as speeding by 20 kilometres per hour and driving through a red light, were 'breaking' the road rules. Therefore to ensure that the young novice drivers in the present research responded to items regarding all transgressions of the road rules, the term 'bending the road rules' was operationalised.

14.3.4 The prototype/willingness model and the young novice driver

The PWM proposes that young adult health risk behaviour occurs due to adolescents' openness to opportunities (a *willingness*) to be less safe rather than a deliberate *intention* to be risky (Ouellette et al., 1999). Accordingly within the context of young novice drivers speeding, a willingness to speed, particularly in the presence of peers (Gerrard et al., 2003), may be a stronger predictor of speeding than future intentions to speed. Moreover, if a young novice driver holds a favourable socially-shared image – a *prototype* – of a typical risky young driver, the more likely the novice is to speed if the circumstances to do so arise (Ouellette et al., 1999). Consistent with SLT, *attitudes* held by the young driver towards following road rules are also pivotal, as are *subjective norms* (i.e., perceptions of what others think and do) of *parents* and *friends*. The PWM constructs are presumed to operate in a temporal and longitudinal fashion, with constructs measured at Time 1 and behaviour measured at Time 2.

The PWM has been applied to understand a range of adolescent risky behaviour including unprotected sex (Thornton, Gibbons, & Gerrard, 2002), smoking (Hukkelberg & Dykstra, 2009), alcohol and illicit drug use (Gibbons et al., 2004) and risky driving (Gerrard et al., 1996; Gibbons & Gerrard, 1995). Other studies have augmented successfully elements of the PWM (e.g., prototypes) within decision-making models such as the theory of planned behavior (e.g., Hyde & White, 2010), including for an examination of young drivers' speeding intentions (Cestac et al., 2011). Accordingly the research will further augment Akers' SLT with willingness and intentions to be risky, safe and unsafe prototypes, and prior speeding, which may provide unique insight into the various influences upon speeding by young novices.

14.3.5 Study aims

The study aims were to develop and test a measurement model for Akers' SLT; and to explore the influences on speeding by young novice drivers including (1) personal characteristics (age, gender, car ownership, reward sensitivity, sensation seeking propensity, depression, anxiety), (2) SLT (differential association, imitation, definitions, differential reinforcement), and (3) PWM (Learner speeding, willingness, intentions, safe/unsafe prototypes). Separate gender analyses will be undertaken also given the reported gender differences in the experience of

psychological distress (Botticello, 2009; Crawford et al., 2001), crashes (Lang et al., 1996) and speeding by young drivers (e.g., Horvath et al., 2012).

14.4 Method

14.4.1 Participants

Young novice drivers (n = 1170, 709 women) aged 17-25 years (M = 17.90, SD = 1.51) volunteered to complete a 30-minute Learner Survey ("Learner drivers"). These drivers had just passed their practical driving assessment (PDA) and progressed from a Learner to a Provisional 1 (P1) driver's licence. Six months later, 378 of these drivers (265 females, M = 18.22 years, SD = 1.59) completed the 30-minute Provisional Survey ("Provisional drivers"). Chi-square analyses revealed participants who completed both surveys were significantly more likely to be female and to be studying.

14.4.2 Materials

Participants completed two similar surveys. The Learner Survey incorporated items exploring pre-Licence driving, attitudes and behaviours of *Learners,* and experiences related to obtaining a Provisional licence in Queensland's enhanced GDL program. The Provisional Survey explored the experiences, attitudes and behaviour of the same drivers who now had six months independent driving experience with a *Provisional* licence.

14.4.2.1 Personal characteristics

In both surveys participants reported their *age* and *gender;* and completed the binary 11-item abridged Sensitivity to Reward Questionnaire (Abridged-SRQ, Scott-Parker et al., 2012d) (*yes*, *no*), the 8-item Brief Sensation Seeking Scale (BSSS, Hoyle et al., 2002) (1 *strongly disagree,* 5 *strongly agree*), and the 10-item Kessler's Psychological Distress Scale (K10, Kessler & Mroczek, 1994, cited in Andrews & Slade, 2001) (1 *none of the time,* 5 *all of the time*) divided into depression and anxiety subscales. All scores were summed. Higher scores on the Abridged-SRQ, BSSS, and K10 indicate greater reward sensitivity, sensation seeking propensity, anxiety and depression. The Provisional Survey gauged car ownership (*yes, no*), and analyses used Provisional Survey responses.

14.4.2.2 Akers' social learning theory constructs

Both surveys included multiple items to measure Akers' SLT (example items):

(a) Differential association ('My friends don't follow all the road rules all the time')

(b) Definitions ('It is sometimes okay to bend the road rules')

*(c)*Imitation ('Seeing my friends bend the road rules influenced me to bend some road rules')

(d) Differential reinforcement ('My mates liked to travel with me because I bent the road rules and made the trip more exciting')

(e) Reinforcement schedule ('Your parents would have taken your keys off you [*if you bent the road rules and something bad happened like you crashed the car*]')

Higher scores indicated more agreement with a construct. All analyses used the Provisional Survey responses.

14.4.2.3 Gerrard and Gibbons' prototype/willingness model constructs

The Learner survey operationalised 6 unsafe and 6 safe prototype items (1 *not at all descriptive;* 7 *extremely descriptive*). One item measured intentions to follow road rules (1 *definitely will not,* 7 *definitely will*) and three items measured willingness-to-speed (1 *very unwilling;* 7 *very willing*). Higher scores indicate more of a construct. Analyses used Learner Survey responses.

14.4.2.4 Speeding

Both surveys contained the Behaviour of Young Novice Drivers Scale (BYNDS), a 44-item instrument with a 5-point Likert scale that measures the frequency of risky driving behaviours (1 *never*, 5 *nearly all the time*) (Scott-Parker et al., 2010). Six BYNDS items capturing the frequency and context in which speeding occurs were summed to comprise a speeding subscale (Scott-Parker et al., in press). Higher scores indicate more speeding.

14.4.3 Design and procedure

Every Learner in Queensland who progressed to a P1 licence April through June 2010 was invited to participate in a longitudinal research project exploring novice driver behaviours and attitudes. Participation incentives included the chance to win petrol vouchers and/or movie tickets. The Learner Survey response rate was 14.4% (n = 1333 drivers aged 17-38 years, 9 393 reminder letters were mailed to

novices). The response rate for novices aged 17-25 years could not be calculated because the ages of novices who did not participate could not be determined due to Privacy restrictions. Six months later, Learner participants completed the Provisional Survey. The attrition rate for drivers aged 17-25 years between surveys was 66.9%. The online survey tool was administered using KeySurvey Enterprise Online Survey Software (IBM).

14.4.4 Statistical analysis

Bivariate correlations explored the strength of association between all variables: between continuous variables utilised Pearson's product moment correlation (r); between continuous and dichotomous variables utilised point biserial correlations (r_{pb}); between dichotomous variables utilised the phi coefficient (ϕ) (Cohen, 1996). Internal consistency was measured using Cronbach's alpha (α). Exploratory factor analysis (EFA) examined the underlying structure of the safe/unsafe prototypes. Confirmatory factor analysis (CFA) was used to construct the SLT measurement model. Due to sample size restrictions (20 participants per parameter is recommended, Kline, 2011), the predictive ability of the various constructs of interest were conducted via regression. Hierarchical multiple regression (HMR) was used to control the order in which variables were entered into regression equations. A minimum HMR sample size of $n \geq 50 + 8m$ (where m = the number of independent variables) (Tabachnik & Fidell, 1996) is required for a preferred power of 80%, and to detect a medium effect size of .20. Unless otherwise stated sample size requirements were met. Analyses were evaluated at significance level $\alpha = .05$. Missing data was not imputed.

14.5 Results

14.5.1. Personal characteristics of the sample

14.5.1.1 Descriptives

The sample was predominantly female (70.1% of P1 drivers), were aged 17-18 years (71.7%), and owned their own car (79.9%). The participants reported moderate levels of depression and anxiety, sensation seeking propensity and reward sensitivity (Table 14.1).

14.5.1.2 Correlations

Strong associations were found between anxiety and depression; and reward sensitivity and sensation seeking propensity (Table 14.1). Moderate association was found between gender and reward sensitivity; greater reward sensitivity reported by male drivers.

14.5.2 Step 1: Akers' SLT

14.5.2.1 Developing the measurement model

The individual SLT constructs were examined separately, with the goal of creating internally consistent scales. Confirmatory factor analysis (CFA) using maximum likelihood estimation was used to ensure that the items contributing to the scales representing the constructs were sound indicators of the constructs (Kline, 2011). Good model fit was determined by a combination of the likelihood ratio chi-square statistic (χ^2 non-significant or less than three times the degrees of freedom), Bentler's Comparative Fit Index (CFI $\geq$ .95), the Steiger-Lind Root Mean Square Error of Approximation (RMSEA $\leq$ .08) including 90% confidence intervals (Kline, 2011), and Tucker-Lewis Index (TLI $\geq$ .95). Path coefficients were also examined. Items were removed in successive iterations due to low factor loading (< .30) until each model exhibited satisfactory fit. The internal consistency (α) of the scales measuring each construct was subsequently calculated via reliability analyses. Results are presented in Table 14.2.

14.5.2.2 Provisional speeding behaviour

A CFA incorporated the six items representing the latent variables 'Learner speeding' and 'Provisional speeding'. The approach undertaken for the behaviour measures in 14.5.2.1 was replicated and both models exhibited good fit (Table 14.2).

14.5.2.3 Descriptives and Correlations

Table 14.1 summarises the means, standard deviations, and reliability of each of the Akers' constructs and the Provisional speeding behaviour measure. The Provisional drivers reported that they held moderately risky attitudes towards bending the road rules, expected punishment for bending road rules, associated with risky drivers such

Table 14.1 Descriptive characteristics of, and correlations between, personal measures and constructs of Akers' social learning theory and Gerrard and Gibbons' prototype/willingness model

Variable [d]	Age	Gen	Anx	Dep	SS	RS	DA	PA	RA	Imi	R	P	UP	SP	Int	W	LS	PS
Age	1																	
Gen	.10 [a]	1																
Anx	-.14 [b]	.13 [b]	1															
Dep	-.06	.10 [a]	.59 [c]	1														
SS	-.18 [c]	-.16 [b]	.15 [b]	.08	1													
RS	-.13 [b]	-.21 [b]	.17 [c]	.16 [b]	.50 [c]	1												
DA	-.04	-.18 [c]	.10 [a]	.13 [b]	.32 [c]	.27 [c]	1											
PA	-.01	-.28 [c]	.06	.00	.35 [c]	.32 [c]	.46 [c]	1										
RA	.14 [b]	.30 [c]	.02	.07	.20 [c]	-.18 [c]	-.21 [c]	-.37 [c]	1									
Imi	-.06	-.19 [c]	.08	.09	.20 [c]	.25 [c]	.42 [c]	.42 [c]	-.17 [c]	1								
R	-.09 [a]	-.28 [c]	.04	.04	-.11 [a]	.32 [c]	.49 [c]	.57 [c]	-.23 [c]	.56 [c]	1							
P	.01	.12 [a]	-.03	.00	-.11 [a]	-.13 [b]	-.30 [c]	-.34 [c]	.39 [c]	-.16 [b]	-.15 [b]	1						
UP	-.05	.10 [a]	.14 [b]	.06	-.15 [b]	-.14 [b]	-.10 [a]	-.20 [c]	.11 [a]	-.16 [b]	-.16 [b]	.12 [a]	1					
SP	-.03	-.06	-.05	.00	.21 [c]	.15 [b]	.12 [a]	.11 [a]	.01	.15 [b]	.18 [c]	-.04	-.71 [c]	1				
Int	-.04	-.26 [c]	.06	.01	.28 [c]	.32 [c]	.22 [c]	.46 [c]	.31 [c]	.24 [c]	.30 [c]	-.24 [c]	-.10 [a]	.08	1			
W	-.11 [a]	-.24 [c]	.10 [a]	.05	.25 [c]	.23 [c]	.28 [c]	.46 [c]	-.29 [c]	.31 [c]	.31 [c]	-.24 [c]	-.15 [b]	.11 [a]	.55 [c]	1		
LS	-.09 [a]	-.19 [c]	.13 [b]	.04	.24 [c]	.31 [c]	.24 [c]	.38 [c]	-.25 [c]	.27 [c]	.37 [c]	-.16 [b]	-.11 [a]	.09 [a]	.52 [c]	.48 [c]	1	
PS	-.13 [b]	-.16 [b]	.18 [c]	.16 [b]	.35 [c]	.40 [c]	.36 [c]	.55 [c]	-.30 [c]	.39 [c]	.46 [c]	-.24 [c]	-.20 [c]	.15 [b]	.49 [c]	.48 [c]	.55 [c]	1
N	1	1	4	6	8	11	4	4	5	5	5	12	6	6	1	4	6	6
Range	_	_	4-20	6-30	8-40	0-11	4-20	4-20	5-25	5-25	5-25	12-60	6-42	6-42	_	3-21	6-30	6-30
M	_	_	6.98	10.38	22.77	3.39	10.67	12.27	18.73	8.73	9.34	41.15	29.98	18.04	2.33	6.15	8.87	10.52
SD	_	_	2.67	4.39	6.62	2.40	5.20	6.23	7.13	5.24	5.35	8.97	8.53	8.31	1.49	3.68	2.89	4.19
α	_	_	.77	.89	.83	.72	.83	.82	.92	.87	.84	.85	.91	.86	_	.83	.78	.87

Note. [a] $p < .05$, [b] $p < .01$, [c] $p < .001$, [d] Gen = Driver gender; Anx = Anxiety; Dep = Depression; SS = Sensation seeking propensity; RS = Reward sensitivity; DA = Differential association; PA = Personal attitudes; RA = Risk assessment; Imi = Imitation; R = Rewards; P = Punishment; UP = Unsafe prototype; SP = Safe prototype; Int = Intentions; W = Willingness; LS = Learner speeding; PS = Provisional 1 speeding. _ = not applicable.

Table 14.2 Akers' SLT and speeding constructs measurement model confirmatory factor analysis results

Model	*N*	χ^2	df	*p*	CFI	TLI	RMSEA [95% CI]	Fit	Revision	Reliability (α)
Differential association	10	540.59	34	< .001	.62	.50	.20 [.18, .21]	poor	6 items removed	
	4[b]	18.77	5	.002	.98	.95	.09 [.05, .13]	good		.83[a]
Definitions	23	2042.37	269	< .001	.71	.65	.13 [.13-.14]	poor	12 items removed	
	11	226.93	59	< .001	.95	.93	.09 [.08, .10]	good	divided into subscales	< .60
Personal attitudes	4[c]									.82[a]
Risk assessment	5[c]									.92[a]
Imitation	9	350.05	26	< .001	.79	.71	.18 (.17, .20)	poor	4 items removed	
	5[d]	192.01	9	< .001	.84	.74	.23 (.20, .26)	poor		.87[a]
Differential reinforcement	17	659.43	118	< .001	.76	.68	.11 (.10, .12)	poor	12 items removed	
	5[e]	35.68	5	< .001	.96	.91	.13 (.09, .17)	good	renamed 'rewards'	.84[a]
Reinforcement schedule	40	2915.69	725	< .001	.64	.61	.09 (.09, .09)	poor	28 items removed	
	12	126.49	44	< .001	.96	.95	.07 (.06, .09)	good	renamed 'punishment'	.85[a]
Learner speeding	6	40.07	12	< .001	.95	.91	.10 (.07, .13)	good		.78[a]
Provisional speeding	6	24.29	12	= .004	.99	.98	.07 (.04, .10)	good		.87[a]

[a] Scales used in hierarchical multiple regression.
[b] Contained 1 item each exploring peer norms, peer behaviour, priority and intensity dimensions.
[c] Personal attitudes (e.g., 'It's okay to bend the road rules if no one gets hurt'); Risk assessment (e.g., 'If you were to bend the road rules regularly (say twice a week for a year), what do you think the chances are you would kill someone (including yourself)', 1 *no chance*, 7 *definitely would happen*).
[d] Contained 2 items each for imitation of peers and other young novice drivers, and 1 item for imitation of parents.
[e] Contained only 'rewards' items – 1 social item, 3 non-social items, and 1 instrumental item.
[f] Contained only 'punishment' items – 5 items for the negative consequences anticipated from friends, 3 items for Police, and 4 items for parents.

as their friends, reported some imitation of risky driving behaviour and some rewards for doing so, and reported speeding as Provisional drivers. Table 14.1 also reports the correlations between the Akers' subscales and with personal characteristics. All correlations were below 0.60.

14.5.2.4 Testing the measurement model

As described in 14.5.2.1, a large number of parameters required testing in the overall measurement model. Due to the small sample size (n = 377) the sample could not be randomly divided into equal halves for development and testing of the measurement model, and the recommended minimum sample size of five measures per parameter could not be met (Kline, 2011). Accordingly the full measurement model could not be tested in a structural equation model and hierarchical multiple regression analyses were instead used to explore the 'ordering' of the constructs and the influence of each of the constructs upon the self-reported speeding by the young novice driver.

14.5.2.5 Exploring the 'ordering' of Akers' SLT constructs

Separate HMR's were performed via the following steps entering: (a) personal characteristics at step 1 (Adj. R^2 = .203); (b) individual SLT subscales/constructs at step 2 (one of six subscales was entered at a time; to explore *definitions* both personal attitudes and risk assessment were simultaneously entered; to explore *differential association* both *rewards* and *punishments* were also simultaneously entered); and (c) remaining SLT individual subscales at step 3 (overall Adj. R^2 = .411). Accordingly the amount of variance explained by steps 2 and 3 was examined. Contrary to the assertion that *differential association* is the strongest predictor of risky behaviour (Adj. R^2 = .043), the subscale 'personal attitudes' explained the most variance in speeding (Adj. R^2 =.178). All constructs explained additional variance (step 3); therefore all constructs were retained for the remaining analyses.

14.5.3 Step 2: Gerrard and Gibbons' PWM

14.5.3.1 Development of the prototypes

As part of an earlier research project, purposive sampling recruited 21 young drivers (12 females) aged 16-25 years (M = 17.71, SD = 2.15) with a Learner (n = 11) or Provisional driver's licence when they visited the food court of a major metropolitan shopping centre during the school holidays (Scott-Parker et al., 2012a). They were asked what words could be used to describe the typical young novice driver, and could be words they, their parents,

friends and other drivers could use. A list of 47 adjectives was generated (20 favourable, 27 unfavourable) and the six most common for each prototype were selected (*safe*: slow, good driver, safe, cautious, aware of dangers, sensible; *unsafe:* foolish, immature, irresponsible, show-off, impatient, lead-foot). An exploratory factor analysis of the 12 words with principal component extraction and varimax rotation using Kaiser normalisation was conducted using the Learner Survey responses. A two-factor prototype model was supported.

14.5.3.2 Descriptives and correlations

Table 14.1 also summarises the descriptive characteristics of the PWM measures. Participants reported some Learner speeding, greater intentions than willingness to speed, and more unsafe than safe prototypes [means for *unsafe* items ranged from 4.83 (lead foot) to 5.19 (show-off), means for *safe* items ranged from 2.65 (slow) to 3.39 (aware of dangers)]. Correlations between items were below 0.60 with the exception of the expected negative correlation of -0.71 between safe and unsafe prototypes.

14.5.4 Step 3: Exploring the influence of personal characteristics, SLT, and PWM

Driver gender, age, reward sensitivity, sensation seeking propensity, depression, anxiety, and car ownership were entered in step 1 of the HMR. Akers' SLT constructs of differential association, personal attitudes, risk assessment, imitation, rewards, and punishment were entered in step 2. Unsafe prototype, safe prototype, willingness, intentions and Learner speeding were entered in step 3. At this final step, significant predictors in order of decreasing beta size were Learner speeding, personal attitudes, depression, reward sensitivity, gender and car ownership and explained 53.7% of variance in self-reported speeding (Table 14.3).

14.5.4.1 Separate gender analyses

Three-step HMRs replicating the structure of the previous analysis (section 14.5.4) were conducted for each gender. The final model was significant for males, F (17, 95) = 11.14, $p <$ .001, and the combination of variables explained 60.6% of variance in self-reported speeding. The significant predictors in order of decreasing beta size were Learner speeding (β = .217, sr^2= .027), willingness to speed (β = .183, sr^2 = .021), rewards (β = .233, sr^2 = .016), and risk assessment (β = -.141, sr^2 = .014); however, the small sample size precludes definitive conclusions. The final model was also significant for females, F (17, 247) = 15.34, $p <$ .001, explaining 48.0% of variance in self-reported speeding. Significant predictors for females in

Table 14.3 Hierarchical multiple regression results for the three analyses predicting self-reported speeding by young novice drivers

Variable	Analysis 1 [a]			Analysis 2 [b]			Analysis 3 [c]		
	β	*p*	sr^2	β	*p*	sr^2	β	*p*	sr^2
Personal characteristics									
Gender	-.084	.081		.059	.177		**.084**	**.032**	**.006**
Age	-.049	.302		-.069	.096		-.066	.076	
Car ownership	-.069	.138		**-.102**	**.012**	**.010**	**-.083**	**.022**	**.007**
Sensitivity to reward	**.263**	**< .001**	**.050**	**.159**	**.001**	**.017**	**.091**	**.034**	**.005**
Sensation seeking	**.189**	**.001**	**.026**	.070	.148		.050	.252	
Depression	.059	.305		.074	.141		**.090**	**.045**	**.005**
Anxiety	.079	.176		.056	.270		.025	.586	
Akers' Social learning theory variables									
Differential association	_	_		-.005	.927		.008	.849	
Personal attitudes	_	_		**.335**	**< .001**	**.058**	**.218**	**< .001**	**.022**
Risk assessment	_	_		**-.096**	**.039**	**.007**	-.045	.284	
Imitation	_	_		**.112**	**.023**	**.008**	.078	.077	
Rewards	_	_		**.123**	**.029**	**.008**	.075	.138	
Punishment	_	_		-.025	.577		-.010	.811	
Gerrard and Gibbons' Prototype/willingness model									
Unsafe prototype	_	_		_	_		-.087	.093	
Safe prototype	_	_		_	_		-.022	.662	
Willingness	_	_		_	_		.074	.119	
Intentions	_	_		_	_		.092	.052	
Learner speeding	_	_		_	_		**.317**	**< .001**	**.063**
Adjusted R^2	*.203*			*.411*			*.537* [d]		
R^2 change	*.218*			*.213*			*.127*		

Note. Significant predictors are bolded for ease of reference. [a] Step 1: [b] Step 2: F (13, 364) = 21.27, $p < .001$. [c] Step 3: F (18, 359) = 25.28, $p < .001$. [d] A fourth step was undertaken in which the interactions between gender and the SLT and PWM constructs were entered. The step was not significant (F (15, 344) = 1.48, $p = .11$, $\Delta R^2 = .027$) and only one interaction was significant (gender/sensation seeking propensity, $p = .025$).

order of decreasing beta size were Learner speeding (β = .379, sr^2 = .096), personal attitudes (β = .220, sr^2 = .027), sensation seeking propensity (β = .130, sr^2 = .012), car ownership (β = -.114, sr^2 = .012), and age (β = -.103, sr^2 = .010).

14.6 Discussion

14.6.1 Theoretical implications

14.6.1.1 Personal characteristics

The considerable variance explained by the combination of personal characteristics such as sensation seeking propensity, reward sensitivity and psychological distress in self-reported speeding suggests individual differences require further consideration in road safety research. Gender, car ownership, reward sensitivity and depression remained significant predictors of self-reported speeding *after* the inclusion of other theoretical constructs of interest. For females, younger age, having their own car, and greater sensation seeking propensity was also predictive of more self-reported speeding.

14.6.1.2 Akers' SLT

A measurement model for Akers' SLT was developed in a state-wide longitudinal sample of young novice drivers. Internally consistent subscales were developed, notwithstanding that the goodness-of-fit indices for *imitation* were poor. The contribution of the subscales measuring the constructs within this model revealed that, contrary to prior research (e.g., Akers et al., 1979), *personal attitudes*, rather than *differential association*, explained the most variance in speeding. Further research is required however before a model specifying the causal order of influence upon speeding is defined. Augmenting *personal attitudes* with *risk assessment* to more fully operationalise *definitions* only moderately increased the amount of explained variance. Furthermore, after consideration of other theoretical constructs and behaviour of interest, *personal attitudes* remained the only significant predictor of speeding, particularly for females. Analyses for the males, in contrast, revealed greater *rewards* was predictive of more self-reported speeding, whilst greater *risk assessment* was predictive of less self-reported speeding.

14.6.1.3 PWM

The augmentation of personal characteristics and Akers' SLT with elements of the PWM revealed prior behaviour – Learner speeding – was a significant predictor of Provisional speeding. Contrary to previous research prototypes and intentions were not significant predictors of speeding. For female Provisional drivers, a greater willingness to speed as a Learner driver predicted Provisional speeding.

14.6.2 Practical implications

14.6.2.1 Personal characteristics

The significant influence of depression upon speeding suggests targeted interventions may be beneficial not only for the mental health, but for improving the safety, of the young novice driver. Significant gender differences suggest interventions may need to be tailored to the gender of the young novice driver. In addition, education of young novices, parents, and other supervisors can highlight the increased risk associated with speeding for the young novice who has their own car within the first six months of independent licensure.

14.6.2.2 Akers' SLT

The significant influence of personal attitudes upon young novice driver speeding is consistent with other research (e.g., Fernandes et al., 2007), and suggests interventions should target risky attitudes. As noted earlier, speeding is arguably the most widespread risky and illegal behaviour performed by drivers of all ages therefore broad enforcement campaigns are required. Parents are pivotal in the development of their novice driver – they act as models not only of behaviour but also attitudes to the pre-licence driver, and mothers in particular provide the most Learner driving supervision (Scott-Parker, Bates et al,. 2011). Attitudes and expectancies regarding risky behaviour have been found before the adolescent actually performs the behaviour (e.g., drinking alcohol, Dunn & Goldman, 1998), therefore education should also target the pre-driving teen. In addition, the significant predictors of Akers' SLT for males suggests that interventions targeting their speeding should consider decreasing the rewards and increasing the risks associated with this risky and illegal behaviour.

14.6.2.3 PWM

The augmentation with PWM constructs revealed the association between prior and current speeding, suggesting countermeasures should targeting the Learner driver, their parents, and other supervisors, highlighting the considerable risks associated with speeding in any circumstance. In addition, parents and other supervisors should be encouraged to monitor the Learner's speed compliance, punish deliberate speeding, and counsel the novice regarding pressure-to-speed from other drivers which may arise during peak-hour commuting. Countermeasures could incorporate an additional component encouraging the development of social skills to resist the negative peer influences. Individual feedback after journeys can also reduce subsequent speeding behaviour (Prabhakharan & Molesworth, 2011).

14.6.3 Strengths and limitations

The research has a number of strengths, including two diverse young novice driver populations, one of which comprised a state-wide longitudinal sample representative of Queensland's population distribution profile (62.2% of the participants resided in major cities and 1.6% in remote regions; 60.0% of Queensland's population resided in major cities and 2.0% in remote regions in 2006; Australian Bureau of Statistics, 2010). The overall response rate for the first survey was low, but comparable to recent Australian research (Boufous et al., 2010). Substantial attrition occurred throughout the project, potentially due to 99% of Queensland being declared a natural disaster area due to flooding during the follow-up period (AAP, 2011).

It should be acknowledged that increasing the number of variables in HMR analyses increases the amount of variance explained, however only variables of theoretical interest were included and the sample size (excluding the moderation analysis for males) were sufficiently large to maintain the power of the analyses. Whilst Akers' SLT has been applied in a young novice driver population (Scott-Parker et al., 2009a, b); it has not been applied to young novice drivers progressing through Queensland's current GDL program, nor has a measurement model been specified and tested. PWM elements also have not previously been applied to such a population. Data were collected via self-report, however the anonymous nature of the surveys likely

ameliorated biases including impression management and underreporting of illegal activity. Self-report data also provided rich information regarding speeding behaviour at two stages of licensure that is not available through alternative sources (Police, licensing authorities).

14.6.4 Future research

Over recent years, young novice driver research is increasingly guided by theoretical frameworks. The application of SLT, including consideration of personal characteristics and elements of PWM, supports such research. In addition, different predictors are important for different risky driving (e.g., speeding, drink driving, Fernandes et al., 2007); therefore future research could apply this research approach to other risky driving behaviours such as drink driving and not wearing seatbelts, and in other driving populations. As noted earlier, SLT does not consider prior behaviour or the influence of willingness and intentions. Future research augmenting SLT with such variables may inform countermeasure development, application and evaluation. In addition, interactions between the psychosocial constructs and other variables of interest to young driver road safety – such as journey purpose and driving exposure – could be considered.

14.7 Conclusions

Young novice drivers continue to be overrepresented in road crash injury and fatality statistics. Countermeasures such as graduated driver licensing have contributed to an improvement in these statistics, however further interventions are required. Road safety researchers recently have begun to consider the psychosocial influences upon the risky behaviour of young novice drivers, and Akers' SLT and Gerrard and Gibbons' PWM provide suitable frameworks to examine the self-reported speeding of Provisional drivers as they progress through a GDL program. Future applications of Akers' SLT should apply a sound measurement model. The variety and extent of psychosocial influences upon the self-reported speeding of the young novice driver suggest that a multi-faceted intervention approach is required. Moreover, general and gender-specific countermeasures could be considered.

14.8 Chapter summary

Chapter Fourteen reported the development and testing of Akers' measurement model; and a series of hierarchical multiple regression analyses examining the psychsocial, SLT, and PWM predictors of self-reported speeding by the young Provisional driver. Importantly the paper is a clear and concise synthesis of the pivotal findings of the preceding papers. To conclude the program of research, the next chapter, Chapter Fifteen, reports a confirmatory factor analysis of the BYNDS which was developed in Paper One (Chapter Five).

Chapter Fifteen: Confirmatory Factor Analysis of the Behaviour of Young Novice Drivers Scale (BYNDS)

15.1 Notes

Taken from:

Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2012). Confirmatory factor analysis of the Behaviour of Young Novice Drivers Scale (BYNDS). *Accident Analysis and Prevention, 49,* 385-391. doi: 10.1016/j.aap.2012.02.021

All authors meet the criteria for authorship and take responsibility for their part in the publication, with the candidate accepting overall responsibility as first author. In the case of this paper, the candidate was responsible for all aspects of preparing the manuscript including reviewing the literature, formulating the ideas, arguments and hypotheses, interpreting the research findings and their implications, and structuring, writing, and appropriately referencing the manuscript. In addition, the candidate was responsible for the administration of the online survey and the analysis of the data collected. The second, third and fourth authors are members of the candidate's supervisory team and, in addition to providing assistance with manuscript revisions, their contribution to the paper has been supervisory in nature. The co-authors agree to the use of the paper in this dissertation and its publication on the Australasian Digital Thesis database consistent with any limitations set by publisher requirements.

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Paper Eleven (Chapter Fifteen) is the final *behaviour* (Bandura's RDM) paper within the research program, and concludes the program of research by building upon Paper One. In Paper One (Chapter Five), the Behaviour of Young Novice Drivers Scale was developed through exploratory factor analysis. A reliable and potentially-valid 44-item instrument was developed and was used in 9 of the 10 remaining papers. In Paper Eleven, the Behaviour of Young Novice Drivers Scale is refined through confirmatory factor analysis, and a reliable 36-item instrument is developed.

15.2 Abstract

Purpose: The greatly increased risk of being killed or injured in a car crash for the young novice driver has been recognised in the road safety and injury prevention literature for decades. Risky driving behaviour has consistently been found to contribute to traffic crashes. Researchers have devised a number of instruments to measure this risky driving behaviour. One tool developed specifically to measure the risky behaviour of young novice drivers is the Behaviour of Young Novice Drivers Scale (BYNDS) (Scott-Parker et al., 2010). The BYNDS consists of 44 items comprising five subscales for transient violations, fixed violations, misjudgement, risky driving exposure, and driving in response to their mood. The factor structure of the BYNDS has not been examined since its development in a matched sample of 476 novice drivers aged 17-25 years.

Method: The current research attempted to refine the BYNDS and explore its relationship with the self-reported crash and offence involvement and driving intentions of 390 drivers aged 17-25 years (M = 18.23, SD = 1.58) in Queensland, Australia, during their first six months of independent driving with a Provisional (intermediate) driver's licence. A confirmatory factor analysis was undertaken examining the fit of the originally proposed BYNDS measurement model.

Results: The model was not a good fit to the data. A number of iterations removed items with low factor loadings, resulting in a 36-item revised BYNDS which was a good fit to the data. The revised BYNDS was highly internally consistent. Crashes were associated with fixed violations, risky driving exposure, and misjudgement; offences were moderately associated with risky driving exposure and transient violations; and road-rule compliance intentions were highly associated with transient violations.

Conclusions: Applications of the BYNDS in other young novice driver populations will further explore the factor structure of both the original and revised BYNDS. The relationships between BYNDS subscales and self-reported risky behaviour and attitudes can also inform countermeasure development, such as targeting young novice driver non-compliance through enforcement and education initiatives.

15.3 Introduction

15.3.1 Young novice drivers

The road safety literature has documented the overrepresentation of young novice drivers in fatalities and injuries arising from car crashes around the world for decades. Drivers aged 17-24 years comprised 13.4% of licensed drivers in the Australian state of Queensland in 2010 but they contributed 20.0% of the road toll. In that same year, drivers with a Provisional licence represented 5.3% of the licensed driving population but they contributed 8.6% of the state's fatalities, and 25.3% of road users who were fatally injured died as a result of a crash involving a young driver (DTMR, 2011c).

Fundamental to reducing the risky behaviour of young novice drivers through targeted interventions such as graduated driver licensing (GDL) programs is the *measurement* of the risky behaviour of the young novice driver. A multitude of methodologies (eg., case control, Lam et al., 2003; naturalistic observations, Rosenbloom et al., 2007; logbook analyses, Harrison, 2004; crash insurance reports, Cooper et al., 1995) and a variety of purpose-built and general scales (eg., Speeding Perception Inventory, Gabany et al., 1997; Driver Behaviour Questionnaire, Lawton et al., 1997) have been used to measure the risky behaviour of young novice drivers. Few measurement scales, however, are designed specifically to explore young novice driver risky behaviour (e.g., the DBQ was developed from and for use in adult drivers of all ages).

Whilst self-report has been criticised as being methodologically-unsound as it may be vulnerable to biases such as impression management which can compromise the accuracy of the data, it can be challenging for researchers to identify novice driver risky behaviour – such as driving whilst fatigued and missing an exit or turn whilst driving– without self-report measures. Therefore it is vital that reliable, comprehensive and valid tools specifically designed to measure the risky behaviour of young novice drivers be used to inform countermeasure development and evaluation.

13.5.2 The Behaviour of Young Novice Drivers Scale (BYNDS)

The Behaviour of Young Novice Drivers Scale (BYNDS) was developed by

Scott-Parker et al. (2010) with the aim of providing a reliable and valid instrument to measure the risky behaviour of young novice drivers specifically. In their study, 761 tertiary students aged 17-25 years (M = 19 years, SD = 1.59, mode = 18 years) with a Provisional driver's licence were recruited from Queensland's major tertiary institutions via a broadcast email. Participants completed 63 risky driving items derived from the literature relating to young driver crash risk and GDL restrictions as part of a larger online survey. Participants also self-reported their offence and crash involvement as a Provisional driver, and their intentions to comply with the road rules, including GDL restrictions, within the next year. An exploratory factor analysis of the responses of 238 males and 238 females matched for age and tertiary institution using principal components extraction with oblique promax rotation identified five factors. The items within each factor were summed and comprised five subscales. These subscales were then summed to create a composite BYNDS score. The BYNDS was highly internally consistent (Cronbach's alpha = .95).

Table 15.1 lists the subscales and their corresponding items. As can be seen, the *transient violations* subscale measures driving behaviours that are able to be performed multiple times during the journey; the *fixed violations* subscale measures items that are more stable in nature across the journey; the *misjudgement* subscale reflects driver errors; the *risky exposure* subscale measures the young novice driver's exposure to risky driving times; and the *driver mood* subscale measures the driver's emotive response to driving. Driver mood, transient and fixed violations were weakly associated with self-reported crash involvement, fixed and transient violations were moderately associated with self-reported offence involvement, and transient violations were highly associated with intentions to comply with road rules.

15.3.3 Study aims

The BYNDS was developed using a state-wide sample of *tertiary* students. In addition, the very high internal consistency indicates there may be some redundancy within the BYNDS' subscale(s). Therefore it is timely that the BYNDS be applied in a second young novice driver sample, and the factor structure of the BYNDS be examined. The study had two aims: (a) to examine the BYNDS, self-reported crashes,

offences, and intentions characteristics of a second young novice driver population in Queensland, Australia; and (b) to undertake a confirmatory factor analysis of the BYNDS with the goal of developing a parsimonious, internally-consistent revised version which is consistent with self-reported risky behaviour of the young novice drivers.

15.4 Method

15.4.1 Participants

Three hundred and ninety (113 males, 29.0% male) drivers aged 17-25 years (*M* = 18.23, *SD* = 1.58, Mode = 17, Median = 18) completed a 30-minute online Survey. All drivers had held a Provisional 1 (P1) driver's licence for six months[9]. The participants represented the Queensland population according to access to goods, services and social interactions (Commonwealth Department of Health and Aged Care, 2001); to illustrate, 60.0% of the state's population lived in inner city areas in 2006 (Australian Bureau of Statistics, 2010), and 61.8% of the participants resided in inner city areas, and 2.0% of the state's population and 2.2% of the study participants resided in remote areas.

15.4.2 Measures

Participants reported their age and gender and completed the 44-item BYNDS (Scott-Parker et al., 2010) (1 = *never,* 5 = *almost always*). Participants also responded to items asking if they had been in a car crash and been detected by Police for committing a driving offence as a driver with a Provisional licence (*yes*, *no*); and if they were likely to bend any road rules, including GDL provisions, over the next year (1 = *definitely will not*, 7 = *definitely will*).

15.4.3 Procedure and design

Every Learner driver in Queensland who passed their practical driving assessment and therefore progressed from a Learner to a Provisional 1 (P1) driver's

[9] In the enhanced-GDL program in Queensland, young novice drivers progress from a Learner to a Provisional 1 (P1) licence after successfully completing a practical driving assessment. A P1 driver's licence must be held for a minimum of 1 year. P1 drivers are prohibited from carrying more than one young passenger (excluding immediate family members) between 11pm and 5am (Queensland Transport, 2007f).

Table 15.1 The items within the subscales of the Behaviour of Young Novice Drivers (BYNDS) and their mean and standard deviation

Items	*M*	*SD*
Transient Violations		
You drove over the speed limit in areas where it was unlikely there was a radar or speed camera	1.87	0.93
You went 10-20 km/hr over the speed limit (eg. 72 km/hr in a 60 km/hr zone, 112 km/hr in a 100 km/hr zone)	1.69	0.87
You deliberately sped when overtaking	1.91	1.02
You sped at night on roads that were not well lit	1.37	0.67
You went up to 10 km/hr over the speed limit (eg. 65 km/hr in a 60 km/hr zone, 105 km/hr in a 100 km/hr zone)	2.22	0.94
You went more than 20 km.hr over the speed limit (eg. 60 km/hr in a 40 km.hr zone, 120 km/hr in a 100 km/hr zone)	1.28	0.58
You raced out of an intersection when the light went green	1.77	0.92
You travelled in the right lane on multi-lane highways	2.09	1.03
You sped up when the lights went yellow	2.05	0.91
You went too fast around a corner	1.73	0.72
You did an illegal U-turn	1.33	0.61
You overtook someone on the left	1.56	0.81
You spoke on a mobile that you held in your hands	1.35	0.67
Fixed Violations		
Your passengers didn't wear seatbelts	1.04	0.31
You drove after taking an illicit drug such as marijuana or ecstasy	1.03	0.22
You carried more passengers than could legally fit in your car	1.06	0.30
You didn't always wear your seatbelt	1.03	0.27
You drove without a valid licence as because you hadn't applied for one yet or it had been suspended	1.01	0.15
You didn't wear a seatbelt if it was only for a short trip	1.03	0.19
If there was no red light camera, you drove through intersections on a red light	1.04	0.27
You carried more passengers than there were seatbelts for in your car	1.04	0.23
You drove when you thought you may have been over the legal alcohol limit	1.12	0.36
You drove a high-powered vehicle	1.09	0.39

Misjudgements		
You misjudged the speed when you were exiting a main road	1.27	0.50
You misjudged the speed of an oncoming vehicle	1.34	0.53
You misjudged the gap when you were turning right	1.51	0.48
You misjudged the stopping distance you needed	1.45	0.63
You turned right into the path of another vehicle	1.14	0.38
You misjudged the gap when you were overtaking another vehicle	1.15	0.41
You missed your exit or turn	1.96	0.79
You entered the road in front of another vehicle	1.39	0.57
You didn't always indicate when you were changing lanes	1.42	0.79
Risky Exposure		
You drove on the weekend	3.86	0.97
You drove in the rain	3.18	0.73
You drove at peak times in the morning and afternoon	3.07	1.05
You drove at night	3.40	0.99
You drove at dusk or dawn	2.77	1.05
You carried your friends as passengers at night	2.24	1.00
You drove when you knew you were tired	2.20	0.90
Your car was full of your friends as passengers	1.96	0.97
You went for a drive with your mates giving you directions to where they wanted to go	2.25	1.07
Driver Mood		
Your driving was affected by negative emotions like anger or frustration	1.77	0.84
You allowed your driving style to be influenced by what mood you were in	1.78	0.82
You drove faster if you were in a bad mood	1.70	0.90

Adapted from Scott-Parker, Watson, & King, 2010. The mean and standard deviations were calculated using the raw data in PASW 18.0.

licence in the period April through June 2010 was invited to participate in a longitudinal research project exploring the behaviours and attitudes of novice drivers (due to Privacy restrictions, the invitation was issued by DTMR on behalf of the research team). These drivers completed the first survey exploring their behaviours as Learner drivers at the time of recruitment. A reminder letter providing the hyperlink for the online survey was posted to 9393 drivers who were eligible to participate (again, this letter was issued by DTMR on behalf of the research team). Six months later, the Learner participants completed their second survey exploring their behaviours and attitudes whilst they were P1 drivers. Two reminders which contained the online survey hyperlink were sent to the email address provided in the first (Learner) survey. The online survey tool was created in KeySurvey Enterprise Online Survey Software. Only eligible novice drivers received the survey hyperlink, and the survey site is securely maintained by the Authors' research institution. The behaviours and attitudes reported in the second survey were used in the current analyses.

15.4.4 Statistical analyses

Measures of internal consistency utilised Cronbach's alpha (α). Bivariate correlations between continuous variables utilised the non-parametric Spearman's correlation coefficient (r_s). Bivariate correlations between continuous and dichotomous variables utilised the non-parametric Kendall's tau-b (τ) correlations. Confirmatory factor analysis (CFA) was undertaken to examine the fit of the BYNDS model of Scott-Parker et al. (2010). All analyses were conducted using AMOS version 18 and PASW version 18.0.

15.5 Results

15.5.1 Psychometric properties of the original BYNDS subscales and scale

Table 15.1 also reports the means and standard deviations for the individual items within the original BYNDS. On average, the young novice drivers reported high levels of exposure to risk, such as driving on the weekend and at night, moderate levels of risky driving as evidenced by self-reported speeding and driving whilst affected by their mood and emotions, and driving errors such as missing exits and turns, and lower

levels of risky behaviours such as driving without their seatbelts.

Table 15.2 reports the mean, standard deviation, and α for each of the subscales and the composite BYNDS for the P1 drivers. The participants reported a large amount of risky driving exposure (evidenced by the average score per item = 2.80, on a 5-point scale), a moderate amount of transient violations (1.73) and driving in response to mood (1.78), and some misjudgement (1.36) and fixed rule violations (1.06). The composite BYNDS and the five subscales were highly internally consistent (Table 15.2).

Table 15.2 also shows the correlations amongst (sub) scales, self-reported crashes, offences and driving intentions. Thirty-seven (9.6%) participants reported being involved in a car crash (8.9% of females, 10.7% of males), and 46 (11.8%) participants reported being detected for an offence (9.5% of females, 17.7% of males), as a driver with a Provisional licence. Most participants intended to follow the road rules in the next year (n = 248, 64.8%), with 74 participants (19.3%) unsure if they were going to follow the rules or not and the remaining 61 participants (15.9%) intending to break the road rules in the next year. The bivariate correlations amongst the subscales, the composite BYNDS, crashes, offences and intentions were all statistically significant. The transient violations subscale was most strongly associated with driving intentions. Driving at risky times and transient violations subscales were most strongly associated with self-reported offence detection. Fixed violations and driving at risky times subscales were most strongly associated with self-reported crash involvement.

15.5.2 Confirmatory factor analysis

Prior to confirmatory factor analysis, the individual BYNDS items and the subscales were assessed for normality. The items exhibited considerable non-normality as measured by skew and kurtosis (for example, “Your passengers didn’t wear seatbelts: skew = 9.64, kurtosis = 102.56). This was not an unexpected finding, as most drivers generally follow the road rules, including GDL restrictions. There are implications for the CFA however, as non-normal data will result in an inaccurate assessment of fit (particularly the chi-square test), therefore the model may erroneously be rejected (Anderson & Gerbing, 1988). Transformation of each item did not ameliorate the violation of the normality assumption. In addition to the univariate non-normality, the

Table 15.2 Psychometric properties of and the bivariate correlations between the original Behaviour of Young Novice Drivers (BYNDS) (sub) scales, self-reported crashes, offences, and anticipated driving behaviour

							Correlations with (sub) scales					
Measure	***n***	***M***	***SD***	**α**	**Skew**	**Kurtosis**	**I**	**II**	**III**	**IV**	**V**	**BYNDS**
I Transient Violations	13	22.56	7.40	.89	1.20	1.24	1.00					
II Fixed Violations	10	10.58	1.75	.75	6.25	52.38	.37***	1.00				
III Misjudgement	9	12.22	2.85	.73	1.46	2.88	.43***	.20***	1.00			
IV Risky Exposure	9	25.19	5.23	.81	.14	.19	.50***	.27***	.38***	1.00		
V Driver Mood	3	5.34	2.33	.87	1.11	1.19	.52***	.24***	.39***	.40***	1.00	
BYNDS Composite	44	75.88	15.04	.92	.96	1.19	.87***	.42***	.63***	.79***	.65***	1.00
Crash	_	_	_	_	_	_	.10*	.22***	.14**	.18***	.12*	.17***
Offence	_	_	_	_	_	_	.19***	.17***	.14**	.19***	.13**	.21***
Intentions	1	2.66	1.66	_	.74	-.43	.48***	.28***	.19***	.25***	.37***	.44***

Note: Bivariate correlations between continuous variables utilised the non-parametric Spearman's correlation coefficient (r_s). Bivariate correlations between continuous and dichotomous variables utilised the non-parametric Kendall's tau-b (τ) correlations. – = not applicable. * $p < .05$, ** $p < .01$, *** $p < .001$. Means, standard deviations, Cronbach's alpha, skew, kurtosis, and correlations were calculated using the raw data in PASW 18.0.

data also were found to exhibit multivariate non-normality (kurtosis > 7, West et al., 1995). Therefore it was decided that the confirmatory factor analysis would operationalise the raw data and utilise the Bollen-Stine bootstrap method using 2000 bootstrap samples to adjust for non-normality (Bollen & Stine, 1992) with maximum likelihood estimation. Seven univariate outliers who reported commonly driving in a very risky way were identified prior to the CFA and these were removed from further analyses to facilitate statistical fidelity. In addition, the covariances were examined and were found to be consistent with the factor structure of the exploratory factor analysis conducted in the development of the original BYNDS (Scott-Parker et al., 2010).

The CFA required an assessment of good model fit which was determined by a non-significant Bollen-Stine chi-square (χ^2). In addition, the Joreskog-Sorbom Goodness of Fit Index (GFI $\geq$ .95 indicative of good model fit for a normally-distributed sample), Bentler's Comparative Fit Index (CFI $\geq$ .95), the Steiger-Lind Root Mean Square Error of Approximation (RMSEA $\leq$ .08) including 90% confidence intervals (Kline, 2011), the Tucker-Lewis Index (TLI $\geq$ .95), and Akaike's Information Criteria (AIC) were examined and used for the purposes of model comparison and improved model fit during the iterative CFA process. Modification indices were not used to guide improvement of model fit, rather examination of the individual item loadings informed the iterative removal of items. The original BYNDS model was not a good fit to the data. Table 15.3 summarises the items that were removed and the corresponding goodness-of-fit indices. After iterative removal of eight items, the final model was a good fit to the data.

In an attempt to improve model parsimony, the item *"You travelled in the right lane on multi-lane highways"* was removed from the transient violations subscale. Whilst this behaviour is illegal (punishable by a AUD$60 fine and two licence demerit points, DTMR, 2010b), this item was considered to be the item least likely to contribute to the young novice driver being involved in a crash within this subscale. The model was not a good fit to the data, and it was decided that the revised 36-item BYNDS would be retained at this time. Figure 15.1 illustrates this model.

Table 15.3 Goodness-of-fit indices and the items removed iteratively from the original Behaviour of Young Novice Drivers (BYNDS) Scale

Item	Bollen-Stine		GFI	CFI	TLI	RMSEA	AIC
	χ^2	*p*				(95% CI)	
Full model (n = 44 items)	2340.41	.006	.80	.77	.76	.06 (.06-.07)	2536.41
Step 1 Removed five items with loading < .30	1703.58	.04	.83	.83	.81	.05 (.05-.069)	1879.58
You went for a drive with your mates giving you directions to where they wanted to go							
You drove when you thought you may have been over the legal alcohol limit							
You drove a high-powered vehicle							
Your passengers didn't wear seatbelts							
You didn't always indicate when you were changing lanes							
Step 2 Removed one item with lowest factor loading	1540.50	.02	.84	.84	.83	.06 (.05-.06)	1712.50
You didn't wear a seatbelt if it was only for a short trip							
Step 3 Removed one item with lowest factor loading	1418.13	.04	.85	.85	.84	.06 (.05-.06)	1586.13
You went too fast around a corner							
Step 4 Removed one item with lowest factor loading	1285.74	.06	.86	.87	.86	.05 (.05-.06)	1449.74
Your car was full of your friends as passengers							

Table 15.4 Psychometric properties of the revised Behaviour of Young Novice Drivers (BYNDS) (sub) scales, and the correlation of the revised (sub)scales with the original BYNDS (sub)scales, crashes, offences, and anticipated driving behaviour

Revised							Correlations							
Scale	***n***	***M***	***SD***	**α**	**Skew**	**Kurt.**	**I**	**II**	**III**	**IV**	**V**	**BYNDS**	**Crash**	**Off.**	**Intent.**
I Transient V.	12	20.80	7.00	.88	1.17	1.14	.99***	.38***	.41***	.50***	.51***	.86***	.10*	.19***	.62***
II Fixed V.	6	6.27	1.10	.72	6.09	44.07	.33***	.64***	.12*	.18**	.15**	.32***	.24***	.20***	.28***
III Misjudge.	8	10.96	2.59	.73	1.36	2.28	.40***	.19***	.96***	.33***	.35***	.58***	.11*	.12**	.20***
IV Risky Exp.	7	20.79	4.36	.78	.15	.33	.46***	.25***	.31***	.95***	.37***	.71***	.17***	.17***	.30***
V Driver Mood	3	5.34	2.33	.88	1.11	1.19	.53***	.27***	.38***	.40***	1.00	.63***	.12*	.13***	.39***
BYNDS Comp.	36	64.15	13.09	.90	.86	.74	.89***	.42***	.60***	.75***	.65***	.99***	.16***	.21***	.58***

Note: Bivariate correlations between continuous variables utilised the non-parametric Spearman's correlation coefficient (r_s). Bivariate correlations between continuous and dichotomous variables utilised the non-parametric Kendall's tau-b (τ) correlations. * $p < .05$, ** $p < .01$, *** $p < .001$. Kurt. = Kurtosis. Off. = Offence. Intent. = Intentions. Means, standard deviations, Cronbach's alpha, skew, kurtosis, and correlations were calculated using the raw data in PASW 18.0.

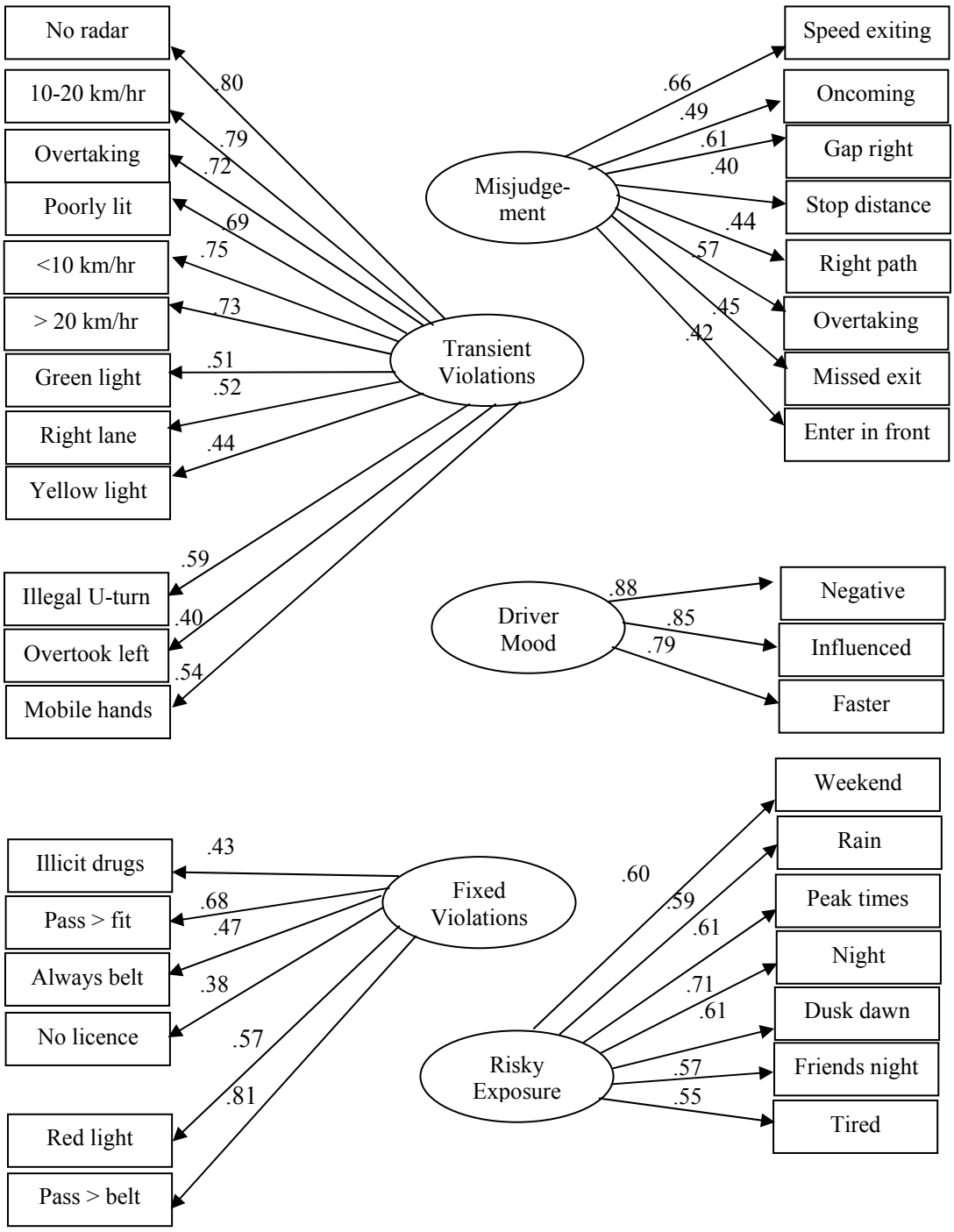

Figure 15.1 The revised Behaviour of Young Novice Drivers Scale (BYNDS) Model

15.5.3 The revised BYNDS and its subscales

The psychometric properties of the revised BYNDS composite scale and its subscales are summarised in Table 15.4, which reports the mean, standard deviation, and α of the revised (sub) scales, as well as the bivariate correlations between the revised BYNDS (sub) scales and the original BYNDS (sub) scales, self-reported

crashes and offences, and driving intentions. As shown, the revised BYNDS (sub) scales were internally consistent, and as expected they were also strongly correlated with the corresponding original (sub) scales.

The revised BYNDS transient violations subscale was weakly associated with self-reported crashes, moderately associated with self-reported offences[10], and strongly associated with driving intentions. The revised fixed violations subscale was moderately associated with crashes, offences, and intentions. The revised misjudgement, risky exposure, and driver mood scales were weakly associated with crashes and offences, and moderately associated with intentions. The revised BYNDS composite scale was weakly associated with crashes, moderately associated with offences, and strongly associated with driving intentions.

15.6 Discussion

The BYNDS emerged from a need for a tool designed specifically for measuring the self-reported risky behaviour of the young novice driver. In addition to the requirement of road safety researchers for instruments that are reliable and valid, and given that multiple measures are typically incorporated in programs of research, parsimonious tools are fundamental. The items within the original, and therefore the revised, BYNDS were drawn from the road safety literature and GDL restrictions. The original scale and subscales exhibited very high internal consistency (Scott-Parker et al., 2010), and these findings were repeated in the current research, notwithstanding the non-normality of the data.

Further, behavioural measures apart from traditional road safety outcomes of outcomes of crashes and offences are required. This is particularly the case as not every road rule transgression is detected by regulatory authorities, such as the Police. Crashes are also comparatively rare events and do not arise from every risky driving manoeuvre; rather, engaging in risky driving behaviour places all drivers – and especially the young novice driver – at greater risk of crashing and incurring harm such as injury and fatality. Behavioural data, in addition to crash and offence data,

[10] Logistic regression analyses were conducted to explore the relationship between the BYNDS subscales and self-reported crash involvement and violations. The subscales explained approximately 12.2% of variance (Nagelkerke R^2) in self-reported crash involvement and 16.6% of variance (Nagelkerke R^2) in self-reported violations. Risky driving exposure was a significant predictor of both crashes ($p = .004$) and offences ($p = .009$); and fixed violations was a significant predictor of crashes ($p = .045$). Caution should be exercised in the interpretation of these findings, however, as the very small sample sizes preclude definitive conclusions.

can also be used to gauge the effectiveness of existing and new countermeasures. Interestingly, the risky behaviour of young novice drivers in Queensland appears to be comparatively constant, irrespective of whether they specifically were tertiary students (Scott-Parker et al., 2010) or novice drivers in general (the current research), and how long they had held their Provisional driver's licence (0-36 months, Scott-Parker et al., 2010, 6 months in the current research).

A more parsimonious 36-item version of the BYNDS which maintains validity and reliability was obtained in the current study. Importantly, the revised BYNDS comprises five subscales of between 3 and 12 items each that can be used individually or in combination. The CFA also provided interesting insight into the risky behaviour of young novice drivers in Queensland. The majority of young novice drivers in Queensland have been found to comply with both general road rules and GDL-specific restrictions (Scott-Parker, Bates et al., 2011; Scott-Parker et al., in press). In addition, the majority of the items removed in the Revised BYNDS reflect illegal behaviour – specifically pertaining to compliance with zero blood alcohol limits, wearing of seatbelts, not driving high-powered vehicles, and indicating when changing lanes – suggesting that on the whole young novice drivers in Queensland are compliant with these restrictions.

It is noteworthy that whilst the CFA was undertaken with a sample in excess of 200 participants, an oft-cited minimum sample size, Kline (2011) recommends larger sample sizes. Seventy percent of the sample was aged 17 and 18 years, and more females than males participated in the longitudinal research project. In comparison, nearly 52% of Queensland's P1 licence population in 2009 was male and 62.1% were aged 17 or 18 years. Separate gender analyses were precluded by the small sample of male participants. However it is noteworthy that male young novice drivers report engaging in risky driving behaviour and therefore, similar to the approach undertaken in the development of the Original BYNDS, further refinement of the BYNDS should consider again utilising a sample matched for age and gender.

Notwithstanding the gender differences, the sample adequately represented the Queensland population according to rurality and access to goods, services and social interactions (Commonwealth Department of Health and Aged Care, 2010). Even though every novice driver in Queensland was eligible to participate in the longitudinal research (see Scott-Parker, Bates et al., 2011, for the study

methodology), and the chance to win petrol vouchers and movie tickets were offered as incentives, the Learner survey was characterised by a low response rate (14.4% of the 9393 Learners of all ages who progressed to a P1 licence participated). The second survey experienced considerable attrition, much of which may be attributable to Queensland's extreme weather including widespread flooding and extensive and lengthy power disruptions at the time of follow-up (AAP, 2011). Importantly the analyses were conducted with the responses to the second survey only. Anonymity and the online nature of the research are anticipated to have ameliorated any self-presentation or other biases which may have influenced the accuracy of self-report data.

The subscales of the BYNDS can inform countermeasure evaluations, development, and can have implications for government policy. To illustrate, consistent with the findings of Scott-Parker et al. (2010), education and enforcement activities should target transient and fixed violations to improve young novice driver road safety. In addition, it appears that both risky driving exposure and misjudgement are also problematic for the young novice driver. For the novices with only six months independent driving experience, risky exposure and misjudgement were associated with crashes and offences. These relationships suggests that government policy may need to address deficits in driving experience in the Learner phase of licensure, and that measures targeting risky driving exposure may need to be introduced in the earliest Provisional phase of licensure. The Queensland GDL is currently being evaluated by an Australian university research centre, and the results of this study could inform the interpretation of the evaluation findings.

Future research should include confirmatory factor analyses of the original and the revised BYNDS measurement models, and in the interests of parsimony further revisions of the BYNDS are recommended. Furthermore, alternate measurement models which consider a second-order factor structure subsuming transient and fixed violations may provide a better fit to the data. The ability of the BYNDS (sub) scales to predict crashes and offences could also be examined, and the BYNDS scores for offenders and crash-involved drivers compared. Future research could also consider separate gender analyses, as well as using methods other than an online methodology. In addition, the BYNDS characteristics of different young novice driver populations around the world can be examined, including the relationships between the subscales and offences and crashes. Objective behavioural

measures such as driving simulation, insurance and Police records of crashes and offences could also be incorporated into these analyses. Preliminary analyses suggest the BYNDS (sub) scales are associated with self-reported crashes and offences, and larger sample sizes can allow full structural equation modelling incorporating additional predictors such as driving exposure to enhance our understanding of the risky driving behaviour of young novice drivers.

15.7 Conclusions

The risky behaviour of young novice drivers has long been recognised to contribute to their overrepresentation in fatalities and injuries arising from road crashes. The BYNDS was designed specifically to measure this risky behaviour, and has been found to be reliable. Furthermore, the significant associations between the various subscales and self-reported crashes and offences suggest that it is a valid measure. However, this validity needs to be confirmed in future research using objective measures of driving behaviour and official driving records. The risky behaviour of participants as measured by the BYNDS in the current study and Scott-Parker et al.'s (2010) previous study was found to be consistent. In the current study, the BYNDS was refined to form a reliable, valid and parsimonious version. Utilising the revised BYNDS, during the first six months of independent driving, self-reported crashes were associated with fixed violations, risky driving exposure, and misjudgement; self-reported offences were moderately associated with risky driving exposure and transient violations; and road-rule compliance intentions were highly associated with transient violations. Further application of the original and the revised BYNDS is required to identify additional and appropriate refinements.

15.8 Chapter summary

Chapter Fifteen is the final *behaviour* (Bandura's RDM) paper within the research program and concludes the program of research by building upon Paper One in which the original Behaviour of Young Novice Drivers Scale was developed. Importantly a shorter, reliable, and potentially-valid Revised BYNDS was refined. The next chapter will be a general discussion of the program of research, and in particular the contribution of each paper to the research aims; the practical, theoretical, and methodological implications; the strengths and limitations of the research findings; and future research directions will be discussed.

Chapter Sixteen: General Discussion

16.1 Introductory comments

This chapter contains a general discussion of the findings reported in Chapters Five to Fifteen containing the 11 papers comprising the research program. The findings of the research will be addressed according to each of the research questions as outlined in sections 2.4 and 3.6. Attention will also be given to the extent to which the findings are consistent with those of previous Australian and international research. The practical, methodological, and theoretical, and methodological implications of the research findings will then be discussed. In addition, strengths and limitations of the research will be examined, and potential future research endeavours suggested.

16.2 Synthesising the research findings

This section will synthesise the research findings across the 11 papers and will be structured according to the five questions underpinning the program of research. In addition, it will synthesise the findings relative to the available literature. It is noteworthy that the young novice driver participants in the cross-sectional and longitudinal research were volunteers who disclosed details regarding their personal characteristics, attitudes, and their driving behaviours. Therefore it is possible that the participants may have been non-risky drivers in general, and may have underreported risky behaviours and over-reported non-risky behaviours. Conversely, it is also possible that the young novice drivers – and males in particular – may have over-stated their engagement in risky driving behaviours which are likely to be reinforced by their peers (consistent with 2.2.3.2). Accordingly, whilst the prevalence of risky driving behaviours as reported in the papers comprising this thesis are indicative of the behaviours undertaken by the participants; it is likely that these figures are underestimates of the true prevalence of risky driving behaviours in the general young novice driver population in Queensland. This issue is further discussed in section 16.2.2 and 16.4.

16.2.1 Research question one

"*What risky driving behaviours do Queensland's young novices engage in as they progress through an enhanced GDL program?*"

The participants reported engaging in a variety of risky driving behaviours, many of which were illegal. These risky behaviours can be categorised as pertaining

specifically to the requirements of the GDL program, or to the general road rule requirements. P1 risky behaviours are of particular interest, as these were measured during the first six months of driving and this is the period during which the novice driver experiences the greatest risk of being involved in a road crash. Risky behaviours occurring during the Learner period are also of interest, as these may reflect deficiencies in supervision, and may establish patterns of behaviour that persist into independent driving.

Risky driving behaviours reflecting non-compliance with GDL include pre-Licence and unsupervised driving; inaccurate logbook records; exceeding night passenger limits, driving high-powered vehicles, driving whilst using a mobile or after drinking; and not displaying novice plates. Overall, a small (12%) proportion of participants reported that they drove on the road before they had a valid driver's licence (Papers Six, Seven), approximately half the proportion of drivers who reported pre-Licence driving in a non-representative New South Wales study (Senserrick et al., 2010). A small (11%) proportion of Learners reported driving unsupervised, and the majority (83%) of Learners reported submitting accurate logbooks (Paper Five). A small (7%) proportion of P1 novices reported driving high-powered vehicles, and driving with an amount of alcohol in their blood (12%), consistent with the compliance rates reported in other Australian studies undertaken by Bates et al. (2009a) and Vassallo et al. (2007).

Risky driving behaviours reflecting non-compliance with general road rules included using a hand-held mobile phone whilst driving, not wearing seatbelts, driving after consuming illicit drugs, carrying more passengers than the car was designed for, and driving in excess of speed limits. Paper Six examined the incidence of these behaviours initially identified in Paper One, and consistent with the GDL-specific behaviours, self-reported compliance was higher during the Learner period than during the first six months of the P1 licence. A moderate (25%) proportion of P1 participants reported driving whilst holding a mobile phone in their hands (Paper Six), which appears to be a lower prevalence than reported elsewhere in the literature (e.g., in the United States, CHOP, 2007) and may reflect increased compliance of young Queensland novice drivers with the conditions of the enhanced-GDL program. It may also reflect greater enforcement in the Australian context, however this requires further investigation.

Most alarming is the considerable proportion of participants who reported that they speed, often regularly, and by large amounts above the posted speed limit. This is again consistent with recent research findings that some novice drivers develop a "risky style" of driving in the earliest periods of their independent licensure (Simons-Morton et al., 2011, p. 2366). Whilst the drivers who volunteered to participate in the research program may not have been representative of all young novice drivers in Queensland, a considerable (80%) proportion of P1 participants reported driving in excess of speed limits and the proportion of drivers reporting speeding by different amounts in a variety of conditions increased substantially from the Learner to the P1 period (Paper Six). To illustrate, one third of Learners reported speeding by 10-20 km/hr, compared to half of P1 drivers.

The majority of P1 participants also reported they had sped in areas where speed-detection devices were unlikely and when overtaking; whilst some P1 drivers reported they had sped at night on poorly lit roads, and by more than 20 km/hr. The proportion of novices reporting speeding is also consistent with the self-reported speeding of Victorian young novice drivers (Vassallo et al., 2007). Speeding is arguably the most widespread and socially-acceptable risky driving behaviour performed by drivers of all ages in countries around the world (Mitchell-Taverner et al., 2003; Stradling et al., 2003). Speeding places the novice at increased crash-risk, therefore it is vital to minimise speeding among Learners to encourage the development of safe driving habits from the beginning of their driving careers (De Pelsmacker & Janssens, 2007) and the first six months of the P1 period especially.

A range of risky behaviours were associated with paying attention to and attempting to avoid the Police. Those participants who reported avoiding the Police were more likely to also report more logbook inaccuracy and more speeding (Paper Six). A larger proportion of drivers who reported more risky driving and greater driving exposure reported paying attention to the Police, facilitating avoidance behaviour. Males reported more avoidance of Police (Paper Eight). Some participants reported that their parents also facilitated punishment avoidance by taking the fine and demerit points for the novice (Papers Four, Six, and Eight).

A subgroup of novices consistently reported risky behaviours (Papers Six, Seven, Ten), including pre-Licence and unsupervised driving, inaccurate logbooks, offence detection, avoiding Police, higher BYNDS scores, risky intentions, and Learner and P1 speeding. This is consistent with the concept of the 'problem young

driver' (Crettenden & Drummond, 1994). Interestingly, these drivers appeared to have some insight into their riskiness, reporting that they were less safe and were more risky drivers than other novices who did not engage in these behaviours (Paper Seven). This suggests that education regarding the risks associated with their driving style is unlikely to effect behavioural change among this group (and possibly in general among young drivers); rather research into the efficacy of earlier, more comprehensive interventions which also include parents would appear warranted.

Owning a car during the first six months of the P1 period was associated with more self-reported risky driving and greater driving exposure, also consistent with other research (e.g., Cammisa et al., 1999; Garcia-Espana et al., 2009). Greater driving exposure was reported by participants who engaged in pre-Licence and unsupervised Learner driving, with those participants who reported more crashes in the P1 phase, and those who reported talking themselves out of a ticket. Greater driving exposure at the start of the P1 period was associated with higher self-reported crash involvement rates. Greater driving exposure after a couple of months into the P1 period was also associated with more self-reported offences, paying attention to, and avoiding Police presence. Avoiding Police presence was associated with more reported experiences of drivers talking themselves out of a ticket, driving unsupervised, and, not surprisingly, paying greater attention to the Police. Further, also consistent with the findings of Elliott and Thomson (2010) and Falk and Montgomery (2007), prior behaviour was the strongest predictor of current behaviour, with speeding during the Learner period predicting speeding during the Provisional 1 period (Papers Six, Ten).

16.2.2 Research question two

"*What impact have the changes to the GDL program in Queensland had upon the self-reported behaviours and experiences of young novice drivers?"*

The research findings appear to support the effectiveness of an enhanced-GDL as a countermeasure targeting the increased risk experienced by all young novice drivers (Crettenden & Drummond, 1994). Paper Five explored the impact of GDL changes by comparing the experiences and behaviours of a matched sub-sample of Learners who participated in the second stage of the research program, with Learners who participated in earlier research (Bates et al., 2009a). Efforts were made to recruit a representative sample of young novice drivers – and for the

comparison in particular – in all stages of the research program. Despite the attempt to match the participants according to residential postcode, the participants may not have been representative of all young novice drivers in Queensland's former- and enhanced-GDL programs. As such the findings may pertain only to the novice drivers who participated in each of the research programs.

Notwithstanding this, fewer participants in the enhanced-GDL program reported driving unsupervised, the greatest difference being for male Learners. Contrary to assertions by some that drivers would experience greater difficulty accruing mandated hours of practice (e.g., as cited in Hinchcliff et al., 2010), fewer drivers in the enhanced-GDL reported difficulty getting supervised driving practice, and the greatest difference was for females. Mothers were reported to be the main supervisor for more Learner participants in the enhanced- than the former-GDL program, and for females especially. The duration of the Learner period increased significantly in the new GDL program, while participants reported significantly more driving practice which was mostly provided by parents and friends. This finding would be expected due to the increase in the period of time required to hold the Learner licence. However, as highlighted in section 9.5.2.1, the GDL changes did not result in a commensurate increase in the mean age for obtaining a Provisional licence due to the earlier eligibility age for the Learner licence.

A smaller proportion of Learner participants reported that they drove unsupervised and had difficulty obtaining supervised practice in the enhanced-GDL compared to the former-GDL program, suggesting parents and novices are undertaking practice in a more structured fashion than was previously the case to ensure the novice is able to accrue the minimum logbook hours. In particular, females reported considerable less difficulty in getting practice in the enhanced-GDL, possibly reflecting a lack of parental support in the old system. Moreover, parental roles have changed considerably; mothers provide more supervision of daughters, fathers provide more supervision of sons. This may be problematic as males consistently accrue more driving offences and engage in more risky driving, and children are more likely to imitate same-sex parent behaviour (Taubman-Ben-Ari et al., 2005). There was also a small increase in the proportion of Learners who reported that they obtained a P1 licence on their first attempt in the enhanced-GDL, and the average number of attempts to pass the practical driving assessment decreased slightly. The self-reported offence-detection experiences of Learner

drivers reduced for males, and crash-involvement of Learners reduced for females, between GDL programs.

This stage of the research program also explored the proportion of participants who reported that they displayed novice plates, and only 66.1% of Learners and 55.8% of Provisional drivers reported always complying with this requirement. Paper Five also examined the nature of Learner driving practice. Most of the Learners reported undertaking the majority of their driving practice at the end of the Learner period, and it is unclear at this time if that will have implications for their P1 driving behaviour. Most Learners also reported continuing to practice during the two-week period between submitting the logbook and the practical driving assessment. A handful of Learners reported that they did not drive at night throughout the Learner period (Paper Six), and this would have contributed to their self-reported logbook inaccuracy because, as noted in 2.3.1.1, Learners are required to accrue a minimum of 10 hours of supervised driving practice at night.

16.2.3 Research question three

"*What are the key personal and social factors associated with the risky behaviour of young novice drivers in an enhanced GDL program?*"

16.2.3.1 Key personal factors

The research program was designed to not only explore *what* particular personal factors are associated with the risky driving behaviour of young novices, but also the *nature* and *extent* of this association. As discussed below, the gender, age, ethnicity, and rurality of the participant, along with their employment, study, and relationship status were all found to be associated with self-reported risky driving behaviour. In addition, the personal characteristics of the adolescent, including psychological distress, reward sensitivity, and sensation seeking propensity were found to be important factors.

16.2.3.1.1 Sociodemographic factors

Consistent with the literature (e.g., DITRDLG, 2010), *gender* was a key personal factor associated with the self-reported risky driving behaviour of young novices in an enhanced GDL program. Male participants consistently reported more risky driving attitudes, experiences and behaviours as evidenced by more risky driving as

measured by the BYNDS (Paper One), including pre-Licence driving (Paper Seven); self-reported speeding in the P1 phase (Paper Ten); and greater rates of unsupervised driving. As noted in 16.2.2, there were significant gender differences in the behaviours and experiences of the novices in Queensland's former- and enhanced-GDL programs, including the incidence of self-reported unsupervised driving, offence and crash involvement (Paper Five). Significantly more male participants reported being detected for an offence during the first six months of P1 driving (Paper Six). Male pre-Licence drivers reported significantly more instances of pre-Licence and unsupervised driving, less difficulty getting driving practice, and more crashes during the first six months of the P1 period (Paper Seven). A significantly greater proportion of male P1 participants reported avoiding the Police (Paper Eight). The risky behaviour of young females was moderated by possibly incurring harm to themselves or other road users; whilst males identified potential costs including legal consequences and loss of mobility as motivations for 'getting smarter' about where and when they were risky on the road (Paper Four).

Consistent with the literature (e.g., Williams, 2009), *age* was a key personal factor associated with the self-reported risky driving behaviour of young novices in an enhanced-GDL program. Whilst the research program examined the behaviour of young novice drivers aged 16-25 years in general, participant age was a significant predictor of risky driving, with the 'older' novices reporting more risky behaviour as measured by the BYNDS (Paper Two). However, the older participant did not always emerge as the most problematic group. While older drivers reported more inaccurate logbooks, younger novices reported more crashes, offences, and speeding in the P1 period (Paper Six).

Ethnicity was a key personal factor associated with the risky driving behaviour of young novices in the enhanced-GDL program. A significantly larger proportion of P1 participants who were not born in Australia and who did not speak English as the main language at home did not have their own vehicle (Paper Seven), and reported paying less attention to the presence of Police (Paper Eight). A significantly greater proportion of Learner drivers who were not born in Australia and who did not speak English as the main language at home reported pre-Licence driving (Paper Seven). This is in contrast to the findings of the DRIVE study, a prospective cohort study exploring the behaviours and characteristics of young novice drivers in the neighbouring Australian state of New South Wales, which

reported that young novice drivers born in Asian countries were *less* likely to report pre-Licence driving than those born in Australia or New Zealand (Senserrick et al., 2010). In addition, a greater proportion of novices from a non-English speaking household reported submitting inaccurate logbooks (Paper Six).

Rurality was also a personal factor associated with the risky driving behaviour of young novices in the enhanced-GDL program. Nearly every crash reported by a P1 driver was reported by a participant in an urban area (Paper Eight), consistent with the findings of the DRIVE study (Chen et al., 2009). Rural P1 drivers reported less driving exposure in terms of duration and distance travelled; more Police avoidance; and whilst not significant, a greater proportion of rural drivers reported car ownership.

Further, the personal factors of *employment, study, and relationship status* were found to be associated with the risky driving behaviour of participants, consistent with the finding that young Victorian adults with multiple speeding violations were also less likely to be studying and have a lower education level, and to be more likely to be employed (Smart & Vassallo, 2005). A greater proportion of P1 drivers who were not studying and were employed reported having their own car (Paper Eight). Employment appears to provide the financial means to purchase and maintain the car and to provide the opportunity for the young novice to engage in risky driving, consistent with the findings of Bingham et al. (2005) who reported that a greater proportion of young novice drivers who were employed engaged in drink driving. Further, a greater proportion of P1 drivers who were employed reported that they paid attention to the presence of Police (Paper Eight). Furthermore, a greater proportion of Learners who were not studying and were in a relationship reported pre-Licence (Paper Seven) and unsupervised driving. P1 participants who were in a relationship reported more Learner and P1 speeding (Paper Six), consistent with the finding that girl/ boyfriends have been found to influence the risky behaviour of young novice drivers (Shope, 2006). Interestingly, in addition to facilitating social relationships (McGrath & Chu, 1999), car ownership also appears to be pivotal in the dating experience of young adults, with a recent online survey revealing that car-owners are more attractive to the opposite sex than those who do not have their own vehicle (e.g., Confused.com, 2011).

16.2.3.1.2 Psychological traits and states

Consistent with the literature reviewed in 2.2.1.2, *psychological distress, sensation seeking propensity and reward sensitivity* were key personal factors associated with the risky driving behaviour of young novices in the program of research. Paper Two revealed psychological distress was a significant predictor of self-reported risky driving behaviour. Paper Three examined the separate influence of anxiety and depression, and the interrelationships amongst anxiety, depression and punishment sensitivity, and amongst reward sensitivity and sensation seeking propensity, were examined for the first time in the extant literature. Mediation analyses suggested that the influence of punishment sensitivity upon risky driving was subsumed within the influences of depression and anxiety; and whilst conceptually-similar, sensation seeking propensity and reward sensitivity were found to be related yet distinct psychosocial constructs.

A longitudinal investigation of the nature and mechanisms of influence of depression, anxiety, reward sensitivity and sensation seeking propensity (Paper Nine) revealed males and females differed in their experience of these factors over time. Male participants reported greater reward sensitivity and sensation seeking propensity, consistent with other research (e.g., Arnett et al., 1997); and females reported more depression and anxiety, also consistent with other research (e.g., Paxton et al., 2007). Further, male pre-Licence drivers reported greater sensation seeking propensity (Paper Seven).

The pattern of predictors identified in the cross-sectional path analyses exploring *risky driving* (Paper Three) were further investigated in SEM predicting self-reported *speeding* (Paper Nine). For male participants, reward sensitivity was significant; for females, anxiety appeared most influential, followed by reward sensitivity and sensation seeking propensity. Regression analyses (Paper Ten) examined predictors of speeding in a full application of personal and psychosocial characteristics. The significant predictors in the regression model differed for each gender. For both genders, self-reported speeding during the Learner period appeared to be the most influential predictor; for males, willingness, rewards and risk assessment – and for females, personal attitudes, sensation seeking propensity, car ownership, and age – were also significant predictors.

Regression analyses revealed depression was a significant predictor of self-reported speeding of drivers during the first six months of the P1 period in a full

theoretical model (Paper Ten). Moderation analyses revealed that sensation seeking propensity was a significant predictor of self-reported speeding for the female P1 participants. Psychological traits and states were also examined according to various P1 driver characteristics, including owning their car, paying attention to and avoiding Police. Contrary to the findings of other studies (e.g., Klauer et al., 2011), sensation seeking propensity, reward sensitivity, depression and anxiety did not differ between P1 drivers who reported owning a car and those who didn't. Pre-Licence drivers (Paper Seven) and P1 (Paper Eight) drivers who reported more paying attention to the Police and avoiding their presence reported greater sensation seeking propensity and reward sensitivity.

16.2.3.2 Key social factors

The qualitative research undertaken in Stage One of the program of research, along with the quantitative longitudinal research in Stages Two and Three, examined the key social factors associated with the self-reported risky driving behaviour of young novices as guided by the literature review.

16.2.3.2.1 Parents and peers

Consistent with the literature reviewed in 2.2.3.1 and 2.2.3.2, *parents and peers* emerged as key social factors associated with the risky behaviour of young novice drivers in the program of research (e.g., Bonino et al., 2005; Shope, 2006). Whilst the majority of the findings in this section pertain to the qualitative research (Paper Four), the pivotal role of parents and peers in the (non) performance of risky behaviour by participants was confirmed in the quantitative research reported in Paper Ten. Parents and peers were models to imitate or ignore, and were actual and anticipated sources of punishments and rewards. Most participants believed that the reactions to risky behaviour by parents and friends – in terms of both rewards and punishments – relied to a large extent upon the motive for the behaviour. Further, reactions were also dependent upon the *outcome* of the risky driving behaviour: if nothing 'bad' happened (e.g., crash, infringement notice), the novice did not expect to be punished. This belief was predominantly based on the influence of punishment avoidance which was experienced as rewarding, consistent with the tenets of social learning theory (see 3.5.1). In contrast, if something 'bad' happened, novices

expected punishment and the likelihood of a rewarding experience was reduced, again based on prior experience of a 'bad' outcome and its consequences.

Some participants who had received a traffic infringement reported that their parents ensured they 'suffered' additional consequences, such as having their access to an alternative vehicle denied and their parents refusing to drive them to and from social events. Most frequently, however, parents did not appear to impose additional punishments. Some parents did however appear to impose 'emotional' punishments, such as ensuring their children were aware of how disappointed they were in their behaviour. It is noteworthy that supervision of Learners by their parents was not always thorough and consistent. A considerable proportion of Learners reported regularly 'bending' road rules during their supervised journeys, including speeding, and that their parents did not mention, let alone correct or punish, this behaviour. This is problematic as this can be interpreted as implicit approval for illegal behaviours by the young novice (e.g., Bonino et al., 2005). Consistent with research in other countries such as the United States (e.g., Carlos et al., 2009), few parents reportedly demonstrated extended supervision, such as requiring their P1 driver to notify them of journey destinations and return times.

Young drivers of both genders and during the Learner and P1 licence stages reported that their friends were likely to reward risky driving, also consistent with previous research (e.g., Arnett, 2002; Williams et al., 2007). Whether friends explicitly requested the participant do so or not, the young novice reported that their friends expected them to drive in a risky style when they were carrying passengers, and males in particular reported feeling powerless to resist this pressure which is also consistent with earlier research (e.g., Regan & Mitsopoulos, 2001). The punishments imposed by friends for (non-) risky driving were reported to be effective in changing behaviour to be (more) less risky; however it appeared that friends rarely punished risky driving. The age of the friends was also important: similar-aged friends reportedly tended to encourage risky driving, whilst older friends with more driving experience themselves tended to discourage risky driving.

Importantly, risky behaviour by some P1 drivers appeared to help to define their self-identity, which is again consistent with the literature (e.g., Bonino et al., 2005; Stradling, Meadows & Beatty, 2001). Some participants reported they were independent, and as such could resist the negative influences of parents (who were risky driving models) and friends (who were also risky driving models and who

overtly pressured them into risky driving). Some novices also reported a 'duty' of sorts to 'buck against' the perceived social stereotype of the risky young novice driver. These young novice drivers appear to have developed their self-identity, remaining true to their own non-risky personality irrespective of the negative psychosocial influences evident in their immediate social environment.

16.2.3.2.1 Police

Interestingly the qualitative research in Stage One (reported in Paper Four) found that interactions with and the behaviour of the Police were associated with the young novices' risky driving behaviour. A lack of Police punishment was reportedly experienced as rewarding by the majority of participants, and by males in particular. Some participants reported extensive experience in 'conning' Police and talking their way out of infringement notices after detection. Police were looked upon with contempt by a considerable proportion of young novice drivers, particularly by young male Provisional drivers who felt 'persecuted' because they were required to display novice plates. Novices who had managed to talk themselves out of a ticket not only once or twice, but many times from as early as the beginning of the Learner period, also viewed the Police with disdain. Some novices who received an infringement notice and associated demerit points for one offence reported this was rewarding as they often had violated more than one rule and they had escaped punishment for the other violation(s), preventing immediate license suspension. As noted in 16.2.1 and thus far in 16.2.3, paying attention to the presence of Police and avoidance of them was incorporated into the remaining two quantitative research stages and further examined in Papers Six and Eight and was found to be associated with self-reported risky driving behaviour of young novices.

16.2.4 Research question four

"*What are the underlying dimensions to the risky behaviour of young novice drivers in an enhanced GDL, and can they be measured in a valid and reliable way?*"

Stages One and Three of the research program were designed to specifically address research question four, with the 44-item BYNDS developed through EFA (Paper One) and subsequently refined through CFA (Paper Eleven). A self-reported speeding subscale was further extracted from the BYNDS (Paper Six).

The initial pool of items examined in the EFA (Paper One) was drawn from the literature relating to young driver risky behaviour and crash involvement (as reviewed in Chapter Two). The EFA produced a five-factor solution reflecting the five underlying dimensions to the risky behaviour of young novice drivers in an enhanced-GDL. The first factor was labeled *transient violations* and consisted of risky behaviours that can be performed multiple times throughout the journey, such as speeding. The second factor was labeled *fixed violations* and contained risky behaviours that are stable throughout the journey, such as driving after using illicit drugs. The third factor was labeled *misjudgment* and comprised driving errors, such as misjudging the required stopping distance. The fourth factor was labeled *risky exposure* and captured driving conditions which place the novice at greater risk of crash, such as driving at night with friends as passengers. The fifth factor was labeled *driver mood* and included items assessing the driver's emotional driving, such as driving faster if they were in a bad mood.

In order to examine different aspects of risky driving, the five factors were treated as subscales. The research confirmed that the BYNDS composite and each of the subscales could be used in isolation or in combination, and were internally consistent. In addition, the subscales as well as the composite scale were correlated with self-reported crashes and offences, albeit weakly, suggesting the validity of the instrument. Further, whilst the actual items differ, BYNDS subscales appear to align with DBQ subscales, whose validity has already been established in the road safety literature (to illustrate, *fixed* and *transient violations* appear consistent with *highway code violations*; *misjudgement* appears consistent with *errors*).

The original BYNDS did not exhibit acceptable goodness-of-fit in CFA analyses utilising a second statewide sample of P1 drivers (Paper Eleven). Iterative analyses resulted in a 36-item BYNDS with acceptable goodness-of-fit and the same factor structure. The internally consistent revised subscales appeared also to be valid, and subscales and the composite scale were correlated, albeit weakly again, with self-reported crashes and offences. A reliable and potentially-valid speeding subscale was also developed from items within the transient violations subscale (Paper Seven). CFA confirmed this subscale had acceptable goodness-of-fit (Paper Ten). As will be discussed later (see 16.5), however, further research is required to confirm the validity and utility of the BYNDS, its subscales, and the speeding subscale.

16.2.5 Research question five

"*Can Akers' SLT explain the risky behaviour of young novice drivers in an enhanced GDL, and can this explanatory ability be enhanced by augmenting it with elements from other social psychological theory and individual characteristics relevant to young novice driver risky behaviour?*"

Paper Four reported the results of a thematic content analysis of interviews with young novice drivers regarding the influences of parents, peers and Police upon their risky driving, and the findings were positioned within Akers' SLT. Paper Ten developed a measurement model of Akers' SLT, and this contained six subscales of personal attitudes, differential association (the final version explored association with peers, not parents), imitation (of parents, peers, other drivers), anticipated rewards (social, nonsocial, instrumental), anticipated punishment (from parents, peers, Police), and risk assessment (outcomes likely in risky situations). The explanatory ability of these subscales was examined in regression analyses examining self-reported speeding behaviour. Contrary to the suggestion in the literature (e.g., Akers et al., 1979) that differential association is the most significant predictor of deviant behaviour among adolescents, personal attitudes explained the most variance in self-reported P1 speeding. Importantly, Akers' SLT proved useful in explaining the risky driving behaviour of young novices in an enhanced GDL, and this is consistent with earlier research exploring the risky behaviour of young novice drivers undertaken by the PhD candidate (Scott-Parker et al., 2009a, b).

An HMR in which personal characteristics were entered at step one; Akers' constructs entered at step two; and selected PWM constructs were entered at step three explained substantial variance in participant speeding; with gender, car ownership, reward sensitivity, depression, personal attitudes, and Learner speeding also emerging as significant predictors. This was also a more comprehensive of variables explaining speeding than that undertaken in Paper Six in which sociodemographic characteristics were entered in step one, and pre-Licence, Learner and P1 behaviours were entered in step two to again explain substantial variance in P1 speeding. Age, relationship status, unsupervised driving, logbook inaccuracy and Learner speeding were significant predictors in that model. The research findings confirm the explanatory ability of Akers' SLT and that it *can* be enhanced by augmenting it with elements from other social psychological theories and individual characteristics relevant to young novice driver risky behaviour.

16.3 Implications of the research findings

Comprehensive investigation of the risky driving behaviour of young novice drivers is vital if effective countermeasures are to be developed and implemented to improve road safety not only for young novice drivers, but for all road users who share the road with them (Shope & Bingham, 2008). Throughout the research program, whilst some of the risky behaviours examined may have been unintentional and due to driver inexperience (such as misjudging driving speeds when exiting main roads), the great majority of the behaviours examined were arguably intentional in nature, suggesting that these behaviours can be modified (O'Connell, 2002). Such change requires a multifaceted approach, utilising a combination of education and training, enforcement, and engineering (Fell & Voas, 2006; Williams, 2006a, b), in addition to rehabilitation and incentives. It is likely that further restrictions and education within the Learner and P1 phases of novice licensure are required, and additional efforts are required to target the pre-Licence adolescent. Furthermore, these efforts will also need to involve parents, friends, the wider community, licensing and enforcement authorities (Juarez, Schlundt, Goldzweig, & Stinson, 2006; Shope & Bingham, 2008; Williams, 2006a, b). Different analyses identified various important factors in risky behaviour, therefore a variety of countermeasures may need to be implemented (Begg et al., 2003; Fernandes et al., 2007). The practical, methodological and theoretical implications of the research findings are discussed below and consider the interactive framework of the variables of *behaviour*, *person* and *environment* (comprising structural and social facets) of Bandura's reciprocal determinism model, which has provided the overarching theoretical framework for this program of research (see section 3.2). Implications for road-safety and non-road safety interventions will be highlighted where appropriate.

16.3.1 Countermeasure implications

The multitude and variety of the risky driving behaviours of the young novices participating in this research gives rise to a number of countermeasure implications for road safety and non-road safety countermeasures. Central among these is the potential to strengthen existing countermeasures such as GDL through efforts to increase *compliance* with current restrictions and conditions. In particular, there is a need to better target non-compliant behaviour among novice drivers through enforcement and related education. Furthermore, parents as the primary

driving supervisor of the Learner, and the primary caretaker of the pre-Licence and the Provisionally-licensed young driver, should also be targeted. Whilst compliance with GDL requirements and general road rules is crucial for ameliorating intentional risky driving behaviours, unintentional risky driving behaviours also need to be addressed. Moreover, the research findings suggest that new and existing road-safety and non-road safety interventions should capitalise on the potential of parents, peers and Police to be a positive influence upon young novice drivers, whilst also ameliorating and minimising any negative influences.

The synthesis of the research findings thus far in this Chapter has highlighted numerous risky behaviours, and the range of behavioural, personal and environmental (social and structural) factors associated with these behaviours. Table 16.1 summarises these factors in terms of general and GDL-specific road rule compliance, and additional learner and P1 risk factors. As such it highlights the broad range of issues that need to be considered when developing, implementing and evaluating interventions for the risky driving behaviours of interest. As can be seen, these issues can be categorised within the context of education, enforcement, rehabilitation and incentives, and whilst these issues are categorised as separate measures within Table 16.1, a multi-faceted approach to improving novice driver road safety is more likely to be effective (Williams 2006a, b). There are also practical implications for the pre-Licence adolescent, the young novice driver, their parents, young people in general (which includes peers of the young novice and the young novice themselves), and the Police, and combined intervention efforts need to be considered. To illustrate, when parents have been educated regarding the risks and licensing restrictions, enforcement of GDL conditions can support parents in their efforts to improve the on-road behaviour of their child (e.g., Williams et al., 2011).

Perhaps of most importance is the feasibility and practicality of non-road safety and road-safety interventions to improve the road safety of young novice drivers. As such, the demonstrated effectiveness of existing countermeasures and the likely effectiveness of new countermeasures – including enhancements to existing countermeasures – must be considered. A range of interventions merit further consideration, including the development, implementation and evaluation of programs targeting the young P1 driver who persistently speeds (Crettenden & Drummond, 1994); the refinement of novice driver testing procedures to ensure that they reinforce GDL requirements, such as the amount of hours driving experience

required (eg. Cavallo & Oh, 2008); and the use of in-car technology and incentive programs to encourage compliance with speed limits (Lahrmann, Agerholdm, Tradisauskas, Berthelsen, & Harms, 2012) (also see Appendix A). This section, however, will focus upon two interventions in particular which can augment and therefore strengthen Queensland's enhanced-GDL program: (1) social skills and mental health interventions (a non-road safety specific intervention); and (2) an intervention which encourages greater involvement of parents in the driving careers of their novice driver children (a road-safety specific intervention).

16.3.1.1 Social skills and mental health interventions

The research findings suggest that social skills and mental health interventions may be effective in ameliorating the risky driving behaviour of young novice drivers. As already summarised in 16.3.2.3.1, and consistent with the extant literature (e.g., Regan & Mitsopoulos, 2001), young novice drivers reported peer pressure to engage in risky driving. Accordingly, fostering the development of social and resilience skills to resist negative peer influences are important in ameliorating the risky behaviour of young novice drivers. Thus peer support (e.g., Ulleberg, 2004) and resilience training (Botvin et al., 1999; Senserrick et al., 2009; Siegrist et al., 1999) programs merit further application and evaluation. Further, the role of self-reflection in risky behaviour regulation remains relatively unexplored and merits further investigation.

The mechanisms behind the increased risky experienced by young novice drivers experiencing psychological distress (characterised by anxiety and depression) was not explored within the program of research. However the recurring findings that young novice drivers who are experiencing psychological distress engage in more risky driving behaviour, including speeding in particular, merits further consideration. As discussed in 16.3.1.1.1 and summarised in Table 16.1, general countermeasures targeting the distressed adolescent warrant further attention from a road safety perspective, while gender-based countermeasures separately addressing anxiety and depression for males and females may prove more effective. In addition, the drivers who were tertiary students reported more depression and anxiety than the general population of drivers, therefore interventions targeting the tertiary young novice driver may need to be implemented. Psychological distress should be addressed not only for social justice and a right to the improvement of life quality for

Table 16.1 Issues which need to be considered when developing, implementing and evaluating interventions targeting both intentional and unintentional risky driving behaviours among young novice drivers

Behaviours	Issues
General and GDL-specific road rule compliance • **Pre-licence** driving • Learner **unsupervised** driving • Learner **speeding** • Provisional **speeding** • Exceeding **car capacity** • Violating P1 **passenger restrictions** • Driving in response to **mood**	**Education** • **Novices**, **Peers**, **Parents**: Considerable risks of behaviours; explicitly punish and do not implicitly or explicitly reward behaviour • **Adolescents**: Considerable risks of pre-Licence driving • **Novices**: Resilience/social skills training; mental health interventions (anxiety, depression); gender-specific advertising (males: emphasise financial costs and inconvenience; females: emphasise harming others or self); don't carry friends as passengers if they encourage risky driving; comply with passenger restrictions; don't actively avoid Police, rather be a safe driver at all times; discourage willingness to be a risky driver; encourage novices to seek alternative behaviours/transport options; emphasise 'foolishness' and 'immaturity' of risky young novice driver behaviour • **Peers**: Encourage development of safer peer group attitudes, values and behaviours; model safe driving behaviour and attitudes at all times; be a 'safe passenger' at all times; discourage willingness to be a passenger of a risky young novice driver; seek alternative transport options if no belted seat is available • **Parents**: More risky behaviour by novices in relationship; model safe driving behaviour and attitudes at all times; sustained active involvement in the road safety of their novice child from the pre-Licence through the Provisional period
	Enforcement • **Peers**: Refuse to travel as a passenger of a risky driver or if car at full capacity • **Parents**: Punish behaviours, monitor car availability and unauthorised use from pre-Licensure through the Provisional period; do not 'take punishment' for novice; consider imposing additional punishments and driving restrictions if novice child detected for an offence and for speeding in particular (e.g., travel as supervisor of P1 child) • **Police**: Impose legislated sanctions and do not allow novice to 'talk themselves out of a ticket'; ensure detect ALL transgressions when novice is pulled over; consider legal sanctions for inadequate supervision (e.g., Learner speeding) and parental complicity in risky and illegal behaviour (e.g., mobile use, driving high-power vehicle); continue general enforcement (e.g., drink and drug driving, speeding); consider targeted enforcement (e.g., passenger limits and P1 restrictions); irregular rotation of mobile enforcement; combined enforcement initiatives (e.g., multiple consecutive mobile speed cameras, RBT, number plate recognition)

	Rehabilitation • **Novices**, **Parents**: Repeat pre-Licence and Learner offenders attend workshop(s) and enter driving agreement during Learner and Provisional periods • **Novices**: Anger management courses; active and passive feedback (particularly speeding); install in-vehicle devices (e.g., in-car camera, alcohol ignition interlocks, speed limiters) • **Parents**: Improve supervision skills; monitor supervisor of novice and passenger behaviour at this time
Additional Learner risk factors • **Logbook** inaccuracy • **Difficulty** practising • Not displaying **novice plates** • Learner **night driving** • **Misjudgement**	**Education** • **Novices**, **Parents**: 100 hours in the logbook – 10 of which must be at night – is not all that is required to develop an experienced, non-risky P1 driver; keep practising after submitting your logbook, even though you do not get logbook credit for this practice • **Parents**: Structure the Learner practice – regular practice in a great variety of situations from the beginning of the Learner period; do more night driving hours; drive in particularly risky conditions such as peak hour, dusk/dawn, weekend nights; and regular and frequent exposure to risky driving maneuvers such as crossing oncoming traffic, exiting and entering high/freeways
	Enforcement • **Parents**, **Police**: Punish all incidences of not displaying plates, and consider fines for supervisor of Learner who is complicit in non-compliance; ensure all transgressions detected and punished • **Parents**: Additional fines for supervisors of inaccurate night driving entries in logbook
	Incentives • **Novices**, **Parents**: Consider for extensive night practice (≥ 20 hours), practise in risky conditions (e.g., peak hour, dawn/dusk)
Additional P1 risk factors • Provisional risky driving **exposure** • Provisional **car ownership** • Provisional **mileage**	**Education** • **Novice**, **Parents**: Considerable risks of exclusive, unregulated car access in P1 period; rules and conditions of driving stated explicitly (e.g., formal driving agreement) • **Parents**: Avoid exclusive unmonitored access to vehicle for novice; share family car; consider safety features of car the child is driving; do not use a car as an incentive to finish the Learner period, rather delay car ownership as long as possible
	Enforcement • **Parents**: Punish all transgressions; enforce punishments stated in formal driving agreement • **Police**: Detect and punish all transgressions
	Incentives • **Novices**, **Parents**: Reduced health/vehicle insurance premiums for driving only safe cars and enter/enforce driving agreement

all persons, but also because the depressed and anxious adolescent is likely to become the depressed and anxious adult (Avenevoli et al., 2006).

Further, medical professionals treating young novice drivers injured through road crashes need to be aware that the drivers could also be depressed and anxious. More generally, mental health practitioners treating depressed or anxious adolescents need to be aware that their patient could be at additional risk of harm through more risky driving; and that depression in particular is a significant predictor of P1 speeding. Moreover, the young novice whose mood affects their driving may also benefit from mental health interventions provided by medical practitioners and mental health professionals which can ameliorate the effects and experiences of depression and anxiety.

16.3.1.2 Encouraging parental involvement

Parents need to be encouraged to be active in their child's driving from the pre-Licence through the Provisional phase, particularly given their pivotal role in their child's road safety, and also as some parents appear to be less motivated and involved in the road safety of their novice children (Williams, 2006). Parents need to be aware of the considerable role they play in the road safety of their novice driver child, from being a model and source of driving attitudes, behaviours, rewards and punishments, to providing most of the supervised driving practice.

Parents should be encouraged to be good role models for their children of all ages as the imitation of parents was found to be significantly associated with and predictive of P1 speeding. Public education campaigns can highlight the significant social influence of parents, similar to the Australian "Drinking nightmare" campaign targeting youth binge drinking (Department of Health and Ageing, 2008). Efforts targeting parents will also need to encourage them to explicitly sanction (Preston & Goodfellow, 2006; Winfree & Bernat, 1998) and to not explicitly or implicitly reward risky driving behaviours, whilst rewarding safe driving behaviours (King & Vidourek, 2010). Rewards for risky driving were also significantly correlated with and a predictor of self-reported P1 speeding. These rewards were social, non-social, and instrumental in nature; removing or reducing these rewards is likely to reduce the frequency and/or extent of self-reported speeding. Parents are pivotal in punishment: punishments were also associated with speeding by the P1 novice driver, with more anticipated punishments (as measured via reinforcement

schedules) corresponding to less self-reported speeding. Parents may believe they are being helpful by 'taking the punishment' for their child, particularly as the young novice driver has a substantially lower threshold of demerit points before licence disqualification (see Table 2.2), however the research suggested that their children perceived this as rewarding and validation of their risky driving behaviour.

Educating parents of the risks associated with pre-Licence and unsupervised Learner driving, and the need for extensive and effectively-supervised driving practice in the Learner period, is a vital component in any intervention efforts to encourage their sustained and active involvement in the safety of their novice driver children. It appears that targeted education of parents during the Learner phase specifically is required. In particular, the Learner period needs to be better structured to ensure the novice obtains regular and more extensive exposure to risky driving circumstances such as at night (Shope & Bingham, 2008), and exposure to risky driving circumstances, and to driving tasks representative of misjudgements in the P1 period such as exiting and entering freeways and turning across traffic.

Speeding by Learners also appears to be a reflection of poor supervision and lack of consequences, suggesting supervisors (most commonly parents) do not perceive speeding as a safety issue for themselves or their novice children. Learners and parents need to be educated regarding the considerable risk facing drivers who speed, and supervisors should be encouraged to monitor the Learner's driving speed. It appears vital that supervisors – most commonly parents – should be encouraged to be *effective*, instructing not only in safe road use and vehicle control, but also monitoring compliance with GDL-specific and general road rules particularly in the early stages of the Learner period. Parents need to be encouraged to correct and discourage risky driving behaviour with an authoritative or authoritarian parenting style (e.g., Ginsburg et al., 2009). The Learner period should be used to develop safe driving habits and attitudes and reduce the incidence of risky driving in the unsupervised P1 period, rather than be a period in which risky driving behaviour is practiced and reinforced as a consequence of non-punishment and poor supervision, to prevent the development of a risky driving style (Simons-Morton et al., 2011).

Further, both pre-Licence driving and unsupervised Learner driving are indicative of decreased parental supervision and monitoring. Children of parents who monitor their child's behaviour (Bingham & Shope, 2008; Hartos et al., 2000) and have an authoritarian or authoritative parenting style (Ginsburg, Durbin, Garcia-

Espana, Kalicka, & Winston, 2009) report significantly less risky driving behaviour; therefore workshop activities could help develop more effective parenting skills as it relates to driver safety. As such, parents may become more accountable for the driving behaviour of their young novice, and it is likely that the young novice will engage in less risky driving behaviours in the Learner period, rather they will develop safer driving habits (Lahatte & Le Pape, 2008; Prato et al., 2010) which may persist during the P1 phase.

It has also been suggested that mandating 100 logbook hours may mislead parents and novices to believe this is all the practice they need to ensure the novice is a safe and competent driver (Foss, 2007). Rather, parents should be encouraged to accrue as many hours as possible during the Learner period, and licensing authorities and insurance companies could provide incentives to encourage more practice (Bates et al., 2010b). Considering Australia's typical dry weather conditions, driving regularly over an extended duration may be necessary to ensure the novice gains experience in such risky conditions as rain (Harrison, 2004). In addition, the enhanced GDL program specifically requires at least 10 hours of driving in darkness. Whilst the 10-hour requirement may also mislead parents and novices to believe this is all the practice they need to become competent and safe night-time drivers, a small proportion of Learners did not get *any* night driving practice, which is also suggestive of parental complicity and poor supervision, directly contributing to logbook inaccuracy. Parents and young novices should be encouraged to obtain as much night driving as possible.

Approximately one in five Learners reported they had submitted inaccurate logbooks, which may place the novice at greater risk as they have not obtained the minimum amount of supervised practice. Supervisors – most commonly parents – are presumably knowingly complicit in this risky behaviour. Indeed, anecdotal evidence suggests some parents actively encourage unsupervised driving for them to certify as logbook hours (Hurst, 2010). The logbook and separate guide for parents could educate parents and novices regarding the necessity for the logbook to be an *accurate* reflection of the Learner supervision, and in particular emphasise the importance of the novice obtaining 100 hours of supervised driving practice.

Moreover, Learners reported accruing most of their driving practice at the end of the Learner period. Regular practice will assist in the development and maintenance of driving and hazard perception skills, therefore parents and young

novice drivers are encouraged to spread the practice across the Learner period. Practicing mostly at the end of the Learner period also suggests that the young novice and their parents are highly motivated for the Learner to progress to their P1 licence. This is particularly the case when the young novice has a car that is already, or shortly will be, available for them to use (e.g., their own car, the spare family car). The evidence from this research program is consistent with the findings of research undertaken in countries such as the United States (e.g., Cammisa et al., 1999) and suggests that parents should not use a car as an incentive mechanism to progress their Learner to a P1 licence as soon as possible; rather, parents should delay car ownership as long as possible.

A small proportion of Learners reported they did not practice driving at all during the minimum two-week period between submitting their logbook for examination and undertaking their PDA. Rather than focusing upon gaining practice to get 'credit' in their logbook, parents need to continue to be active in the road safety of their novice child and therefore should be advised that driving practice is designed to help them be a safe and competent independent driver. As noted in Table 16.1 they should be encouraged to continue accruing driving practice even though there is no logbook credit.

Educating parents of the risks associated with driving independently during the first six months of P1 driving, and with having exclusive and unregulated access to a vehicle during this period in particular, is another vital component in any intervention efforts to encourage their sustained and active involvement in the safety of their novice driver children. It is noteworthy that family roles often change when the adolescent becomes independently-licensed (Nygard & Grube, 2005), and parents are encouraged to monitor driving during this period, particularly as the young novice driver uses the vehicle not only as a form of transport but also to affirm their social identity (Collin-Lange & Benediktsson, 2010; Redshaw, 2006). Whilst it may be not be feasible for families that have access to a company car only, or families where the P1 driver does not live in the family home, it is recommended that parents share the family vehicle (Garcia-Espana et al., 2009) as this vehicle is often safer with better crash avoidance and protective features than the car that the novice would be able to afford themselves (Williams et al., 2006).

A driving agreement, such as operationalised in the Checkpoints program (see also A.7) (Simons-Morton et al., 2006a, b) which clearly states driving

conditions, privileges, and restrictions, can also encourage the continued active involvement of parents in the road safety of their young novice driver who has begun independent driving. Such agreements can also clarify any confusion regarding the rules for the novice and their parents (Best, 2006; Nygard & Grube, 2005; Sherman, Lapidus, Gelven, & Banco, 2004; Simons-Morton et al., 2002). It is noteworthy that there is also capacity to introduce a driving agreement during the Learner period, and as such not only may this agreement encourage greater parental involvement, it may also foster the experience of regular driving practice with more effective supervision by parents. Further, in addition to the increased behaviour-regulation capacity of parents who have a driving agreement with their Provisionally-licensed child, parents are pivotal in enforcing and supporting their child's compliance with road rules and GDL-specific conditions in particular (Simons-Morton et al., 2006a).

16.3.2 Methodological implications

The key methodological implication arising from the findings of the research program pertains to the measurement of the *behaviour* dimension of Bandura's RDM. In Paper One, the BYNDS was developed through EFA of self-reported behaviours of a matched statewide sample of young novices. In Paper Eleven, the BYNDS was refined through CFA using the responses of a second statewide sample of young novices. The composite and subscales of the original and the revised BYNDS are reliable and were drawn from the extant literature regarding young driver crash risk. The BYNDS also uses the Likert scale responses of the DBQ, an established road safety instrument. In addition, the relationship between (sub)scale(s) scores and self-reported crash and offence involvement were also examined, and significant relationships were found. Accordingly applications of the BYNDS in road safety research and countermeasure development and evaluation will use a practical and methodologically-sound instrument. Moreover, the BYNDS can be easily converted to other driving contexts, for example, by changing 'km/hr' 'miles/hr'. Furthermore, the BYNDS is currently being applied in other young novice driver populations in Australia and the United States, which further supports not only its practical but also its methodological utility. It is noteworthy however that whilst the BYNDS appears to be a reliable and potentially valid instrument, additional validation of the instrument is required via a variety of mechanisms

including further application in other young novice driver populations (see also 16.5).

16.3.3 Theoretical implications

Research into the nature and mechanisms of the risky driving behaviour of young novices, and the development and evaluation of countermeasures, requires the guidance and structure of a theoretical framework (Shope, 2006). The research program was framed within Bandura's RDM and specifically considered not only the *behaviour* of the young novice driver, but also the *person* performing that behaviour, the *structural environment* within which the behaviour was performed within, and the nature and sources of influence within the person's *social environment*. The theoretical implications of the findings of the research program are addressed below according to Bandura's RDM framework.

16.3.3.1 The behaviour

As noted above in section 16.3.2, the development and refinement of the BYNDS has provided a methodological tool to assist with future research in the area of young novice driver safety. The underlying factor structure of the BYNDS also provides an insight into the nature of the factors that increase novice driver crash risk, thus representing a conceptual framework to guide future research. For example, the factor structure that emerged highlights the need to consider the decision-making of young drivers in relation to: i) when they drive (ie. exposure considerations), ii) their state of mind when they commence driving (ie. impairment and emotional considerations); and iii) how they drive during any given trip (ie. considerations relating to their interactions with passengers and other road users). In this respect, the BYNDS has confirmed the complexity of the factors that influence young novice driver behaviour and the need for interventions in the area to be based on sound conceptual/theoretical frameworks.

16.3.3.2 The person

As has been seen throughout the comprehensive research program, personal factors are associated with the risky driving behaviour of young novices. A number of key theoretical contributions of the research program pertain to these personal factors. Principally, additional person-related factors that have not received a great deal of

attention in young novice driver safety research, such as psychological distress, punishment and reward sensitivity, were examined. Interestingly, mediation analyses also provided unique insight into the interrelationships amongst psychological states and traits; relationships that had not previously been investigated in the extant literature. Secondly, these person-related factors were examined within the context of traditional factors including driver gender and age in a holistic way for young people in genera and separately for males and females. Hence the program of research has provided a more comprehensive examination of person-related factors than undertaken in much of the previous research. Research could easily incorporate these factors as additional sources of influence, and the easiest and under-utilised approach in many instances is to conduct separate analyses for categorical variables such as driver gender and age (Kline, 2011). Accordingly young novice driver research, including applications of psychosocial theory such as Akers' SLT, should consider the influence of personal factors such as psychological distress, age and gender.

16.3.3.3 The environment

Whilst not conceptualised as separate sources of influence within Bandura's RDM, the comprehensive research program explicitly explored the influence and nature of the *structural* and the *social* environment. As such, the findings have considerably enhanced our understanding not only of the influence of the structural and social environment upon the risky driving behaviour of young novices, but also the risky driving behaviour undertaken within this structural and social environment.

The research program applied Akers' SLT augmented by elements of PWM to more fully understand the young novice driver's social environment. Some research has considered the psychosocial influences of parents and peers in combination, whilst other applications have considered these influences separately. Scarce examples of consideration of the multiple influences of parents, peers and Police appear in the extant literature relating to young drivers, let alone in conjunction with consideration of personal and environmental influences such as the GDL structural environment. Again, the findings from the research program suggest that *comprehensive* research is needed to more fully understand the nature, mechanisms and extent of the factors that contribute to risky driving among young novice drivers, utilising both cross-sectional and longitudinal methodologies.

Further, Akers' SLT, in contrast to other psychosocial theory such as the PWM and the TPB, does not have a clearly-stated measurement model for testing and application. This has hampered research efforts, and understandings of not only the risky behaviour of interest, but also which constructs are the most important predictors. The research program developed a measurement model containing six psychosocial constructs, which was tested in a HMR predicting the self-reported speeding of P1 drivers. There is also considerable debate within the literature regarding the nature and extent of influence of the various constructs, and specifically regarding the differential association construct. This controversy has not been acknowledged, let alone addressed, by the majority of the extant research applying Akers' SLT. The research of Paper Ten specifically explored this controversy, and is the first such investigation in the literature which also considered the influence of each of these constructs separately. Further, the majority of SLT research does not develop, and subsequently test, a measurement model. Paper Ten also reported both the development and the testing of a measurement model, and the techniques utilised can be replicated in future research.

As noted in Chapter Three, Akers' SLT has had some application within the realm of road safety, including within the domain of young novice driver risky behaviours, and the research findings provide further support for the application of this psychosocial theory in road safety research. Other adolescent research has identified the importance of willingness to be risky, driving intentions and prior behaviours, and a comprehensive investigation of the risky driving behaviour of young novices also requires that these factors be considered within any application of theory. Whilst there is also a need for the ongoing refinement of these theories in the young driver space, Akers' SLT was augmented with elements of PWM, including prior speeding behaviour, and research findings highlight the ability of other factors which are not explicitly considered within SLT to enhance our understanding of self-reported speeding by P1 drivers.

16.4 Strengths and limitations

There are a number of strengths associated with the current research program. Strengths include the use of both qualitative and quantitative techniques, as well as cross-sectional and longitudinal methodologies. In addition, research examining the factors associated with self-reported risky driving behaviour (including speeding),

and interrelationships between personal and psychosocial influences, was undertaken using well-established theoretical, methodical, and logical approaches (Hair et al., 1998).

The comparison of behaviours and experiences of young novice drivers progressing through the former- and enhanced-GDL programs in Queensland was undertaken within the context of a major metropolitan area and a regional city. Most of Queensland's population resides in such areas; therefore these findings may be generalisable to the majority of Queensland's young novice drivers. The research examining behaviours of young novice drivers within the new GDL program in Queensland had participants aged 17-19 years *only,* removing the potential confound of the participants being exposed to two different GDL programs. Whilst this was unlikely given the duration between the 2007 GDL changes and the 2010 recruitment, it ensured the behaviours, experiences, and attitudes of the participants was not influenced by exposure to two different GDL programs.

Online surveys were used in the three stages of the research, and online surveys are easy to complete (Knapp & Kirk, 2003) and cost-effective (Shih & Fan, 2009). The Learner and Provisional Driver Surveys also offered a no-cost paper-and-pencil option for participants without internet access. The online surveys were anonymous, information was treated confidentially, and there were no punitive consequences associated with non-participation. Moreover, considerable amounts of illegal driving behaviour were reported by the participants, counteracting a commonly-made critique of self-report data. Participants completed surveys at their convenience therefore it is unlikely impression management biases influenced their responses, and accordingly their responses were assumed to be honest.

The research program used the ISSS, BSSS, SPSRQ, and K10 which are reliable and valid instruments that have not yet been applied in a young novice driver population in Queensland. Psychometric problems had been identified in the SPSRQ in the foundation research; therefore a refined-SRQ was used in the Learner and Provisional Surveys.

However, the research also featured a range of limitations which need to be borne in mind when interpreting the findings. There was an under-representation of males in the research, with a larger proportion of female young novice drivers choosing to participate in all three stages of research. In response to this limitation, behaviours, personal characteristics, and psychosocial influences were considered

separately for each gender, and separate analyses such as regressions and path modeling were also conducted, to ameliorate any potential gender influences. In addition, the BYNDS was developed using a sample matched for gender, age and tertiary institution.

There are also a number of other limitations associated with the current research program. Whilst the use of self-report data is a limitation, and as such the prevalence of the risky driving behaviours may not have been accurately reported, the research program utilised this methodology for a number of reasons. Firstly, privacy restrictions related to the manner in which driver licensing data is collected in Queensland essentially prevented the researcher from accessing participants' official driving records. To do so would have required written consent from the participants, which was not currently feasible using on-line data collection methods. Secondly, fundamental to qualitative research, the young novice driver was perceived as the 'expert'. This perception also applied to the quantitative research, in which the novice was also considered the expert regarding their behaviours, experiences, attitudes, and their personal characteristics, and the psychosocial influences upon their risky behaviour. Thirdly and most importantly, the vast majority of the information regarding the risky behaviours, attitudes, experiences, personal characteristics, and psychosocial influences could not be collected any other way. Therefore a self-report methodology provided insight that would otherwise be impossible to obtain. In addition, self-reported crashes and offences have been found to be accurate compared to official crash and offence records (Boufous et al., 2010).

The response rate for the Learner Driver Survey was relatively low (14.4%) even after a reminder letter and additional incentives, but not inconsistent with recent Australian research (15.9%, Chen et al., 2009). The Provisional Driver Survey experienced high attrition despite two reminders and additional incentives. Queensland had an exceptionally wet summer during the follow-up period, and two major cyclones struck land in quick succession, culminating in 99% of the state being declared a disaster-area (AAP, 2011). Vast areas were flooded and electricity and telecommunication facilities were cut for extended periods. Accordingly novice drivers may not have received the Provisional Survey email(s) and may not have been able to access the online survey. Irrespective of low response and high attrition rates, the distribution of the Learner and Provisional samples was geographically-

representative of Queensland's population (e.g., see section 9.5.1.1) (Commonwealth Department of Health and Aged Care, 2001).

16.5 Future research

While much has been learned about the risky behaviour of the young novice driver through the program of research, much remains unknown. Longitudinal research can improve our understanding of the development of risky driving behaviour and attitudes, starting with younger adolescents. The quandary regarding whether risky driving predisposes the Learner to develop risky habits which persist in the Provisional period, or whether the risky driver is evident from the first instance of risky driving (e.g., pre-Licence driving) requires further investigation. Parents and friends could be included in this research, and the nature, extent and mechanisms of influence upon the risky driving and attitudes of the adolescent be examined, including the influence of concurrent substance use (Dunlop & Romer, 2010). The role of parental (adequate and inadequate) supervision – including the availability of cars in the pre-Licence and Learner period – merits further investigation. The nature of pre-Licence and unsupervised Learner journeys including destinations, distance, duration, passengers, parent complicity, and parent, friend and police punishments, should be explored in greater depth. It is noteworthy that the Australian state of Victoria has a 24-hour peer passenger restriction for P1 drivers, and that an evaluation of the crash-implications is currently underway. The findings could also have implications for Queensland's GDL program which has a night peer passenger restriction only. The research findings can inform development and evaluation of countermeasures which may include increased parental (and other guardian) monitoring and imposition of conditions and privileges (akin to the Checkpoints program, Simons-Morton et al., 2006a), and in-car technology such as intelligent speed adaptation devices (e.g., Lahrmann et al., 2012) which require access codes for young persons detected pre-licence and unsupervised Learner driving.

Driving exposure, particularly the driving situations and associated hazards that the Learner is exposed to, can provide insight into *how* the Learner actually *learns* to drive, and the development of hazard perception and other important skills such as self-calibration (Simons-Morton, 2007a). Driving circumstances during the first six months of P1 licensure could be compared to the second six months of the

P1 period, when risks have started to decline. Car ownership needs to be examined further, including determining who is buying the car, when, and for what purpose; and the characteristics of the car including crash avoidance and protection features. Driving agreements (Simons-Morton et al., 2006a, b) may be suitable not only during the P1 period but also during the pre-Licence and Learner stages. Strategies that strengthen the supervision of the Learner, including discouraging – and where deemed necessary punishing – intentional risky behaviour, could be developed and implemented, and reasons for non-punishment and non-correction by supervising drivers require examination. Further, continued trialing of in-car recording devices, including observation and feedback apparatus, may not only improve novice driving skills but also develop supervision skills.

The purpose of the journey appears important in the risky behaviour of the young novice driver (see 2.2.4.1); therefore a scale to measure journey purpose could be developed (Chliaoutakis et al., 1999; Shope & Bingham, 2008). Distracted driving by young novices in the Australian context requires more attention, and the findings may need to be incorporated into the BYNDS. Apart from self-reported speeding, given that the majority of the young novices who participated in the research program did *not* engage in risky driving behaviours, and that a small group of young novice drivers appeared to repeatedly place their own well-being – and the well-being of other road users – at risk through a road crash, it appears timely that the concept of the 'problem young driver' (Crettenden & Drummond, 1994) be revisited. In addition, these drivers are likely to be resistant to education-only initiatives; therefore more research is required to develop interventions more suited for this group of young novice drivers.

Longer-term impacts of the enhanced GDL program require examination, including the differential impact upon self-reported crash and offence involvement and risky driving behaviour. The behaviours and experiences of young novice drivers in Queensland could be compared to those in other jurisdictions in Australia (every state and Territory in Australia has their own GDL program, Senserrick, 2009) to further delineate the differential influence of the various features of the GDL programs. Experiences of older (19-20 year-old P1 drivers) and younger (17-18 year-old P1 drivers) novices with the new GDL requirements in Queensland should also be further examined, as could the experiences of novices who were not born in Australia. The potential value of enhanced novice driver testing and assessment

processes also merit consideration. Research which explores the factors influencing novice driver and parental decision making regarding readiness for obtaining a Learner and provisional research is also required and may further reveal avenues of intervention. In addition, the influence of the Police, specifically exploring the effect of direct and indirect interaction with law enforcement authorities, and the effects of punishment avoidance upon young novice driver behaviour should also be examined in greater depth.

The BYNDS needs to be applied in other Provisional driver samples and the factor structure re-examined to refine a robust, valid and reliable instrument. The relationship to crashes, offences and near-crashes in comparison to the DBQ could be examined. Young novice drivers participating in naturalistic studies could complete the BYNDS via an app at regular intervals, and relationships between and accuracy of self-reported behaviour could be compared to actual driving behaviour including crashes and near-crashes which can be identified via G-force events (Simons-Morton et al., 2011), thereby validating the instrument. The risky driving of young novices experiencing anxiety and depression could also be gauged by the BYNDS at regular intervals whilst they receive a mental health intervention to further delineate the influence of psychological distress on their driving behaviour.

16.6 Concluding remarks

Chapter Sixteen comprised a general discussion of the main findings emerging from this comprehensive investigation of the risky driving behaviour of young novice drivers. The research program was designed to address the five key aims of improving the measurement of risky driving behaviour; more fully understanding the risky driving of young novices; examining the impact of changes to the GDL program in Queensland; applying a theoretical framework; and informing the development of countermeasures targeting young novice drivers. To this end, the research program developed an instrument specifically designed to measure the self-reported risky driving behaviour of young novice drivers. The research program also considerably contributed to the understanding not only of the behaviours of young novice drivers in the enhanced-GDL compared to the former-GDL program, it also provided great insight into the nature and breadth of the personal, social, and structural factors associated with the risky driving of the young novice drivers. A measurement model of Akers' social learning theory was created,

tested, and augmented with elements of Gerrard and Gibbons' prototype/willingness model, providing further insight into young novice driver speeding and the utility of psychosocial theory in understanding young novice driver behaviour. Every step of the research program has informed countermeasure development, and the utility of social skills and mental health interventions and encouraging parental involvement in particular were highlighted. The strengths and limitations of the research program were addressed, and these include geographically-representative sampling and a methodical approach to the research, and a relatively low response rate and reliance upon self-report data. Future research endeavours were suggested, including the validation of the BYNDS.

A multifaceted approach to reducing the risky driving behaviour of young novice drivers will require a combination of education and training, enforcement, and engineering. Young novice drivers themselves will need to be targeted, in addition to parents, friends, the wider community, and licensing and enforcement authorities. Further research is also required to more fully understand the nature and mechanisms of influence upon young novice driver risky behaviour, and to develop, implement, and evaluate effective countermeasures including additional enhancements to Queensland's graduated driver licensing program.

Chapter Seventeen: References

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Chapter Eighteen: Appendices

Appendix A: Literature review of young novice driver countermeasures

Appendix A: Literature review of young novice driver countermeasures

As noted in Chapter Two, a range of countermeasures designed to ameliorate and manage on-road risky driving behaviour, such as driver training and education, in-car technology, media campaigns, incentive programs, peer and parent monitoring and support programs, medical professionals, legislation and enforcement, and rehabilitation, remediation and retraining programs, have been applied in various formats in motorised jurisdictions throughout the world with varying degrees of success in modifying the behaviour and crash and involvement of young novice drivers. However, their role in reducing the risky behaviour and increased crash involvement of young novice drivers is not central to the scope of the research program. Nonetheless, an understanding of these countermeasures is important for interpreting the implications of the research findings. As such, a brief literature review regarding each of these interventions is now provided for the reader in this Appendix.

A.1 In-car technology

Whilst in-car technology is a common source of distraction for the young novice driver, it is also uniquely positioned to be a risky behaviour countermeasure (Lee, 2007). Simulator-based research suggests that in-car devices that distract young drivers can also redirect their attention to the driving task (Donmez, Boyle, & Lee, 2007). A variety of in-car technology, including speed governors, seatbelt reminders, and drowsiness detectors, is available as an instrument that can be retrospectively fitted to vehicles (OECD, 2003; Sivak et al., 2007). The cost of these devices may be prohibitive for families of young drivers, and the effects of such devices upon the crash risk of young novice drivers as yet remain unexplored (OECD, 2006; Twisk & Stacey, 2007). Parents in the United States, and mothers in particular, however, report they would like to know when their child is engaging in risky behaviour such as speeding, and how many passengers they are carrying in the car (McCartt, Helinga, & Haire, 2007), and such devices may be able to assist. ‘Teen driver support systems’ combining a variety of technologies including seatbelt and alcohol ignition interlocks, data loggers and mechanisms of driver identification (Brovold et al., 2007) have the potential to modify the young novice driver’s risky behaviour (Hogge & Sherlock, 2005). Young drivers of simulated vehicles fitted

with an intersection collision warning system have been found to have a reduced crash rate, primarily attributable to shorter reaction times and slower driving speeds (Chang, Lin, Hsu, Fung, & Hwang, 2009). Parents also indicated that they would support the use of driving-monitoring technology to regulate the behaviour of their young novice (McCartt et al., 2007); though few parents actually do so.

Recently, active learning via concurrent and retrospective feedback has emerged not only as a potential learning tool but also as an intervention for risky driving. Young novice drivers have been found to be involved in fewer risky driving events when the novice and their parents review their driving mistakes via weekly retrospective feedback from forward- and rearward-view video recordings triggered by exceeding acceleration or deceleration thresholds. Seatbelt wearing also increased from 82% at baseline to 97% after the intervention, and crashes as a result of negotiating a 90^{o} turn too quickly decreased by a magnitude of five times (McGehee, Raby, Carney, Lee, & Reyes, 2007). Concurrent feedback from a Green Box device which recorded young novice driver risky maneuvers such as sudden braking and acceleration halved the incidence of these events (Musicant & Lampel, 2010). Whilst both concurrent and retrospective feedback has been found to reduce duration of eye gaze away from the road and braking reaction time (Donmez et al., 2008), the feedback device in the vehicle alone is not enough to ensure the data is viewed by both parents and the novice (Guttman & Gesser-Edelsburg, 2011); therefore the full potential benefits of feedback may be unrealised.

A.2 Legislation and enforcement

Legislation has been pivotal in the safety of all road users (e.g., seat belt laws in Australia, Milne 1985; Elliott, 1992), and enforcement of legislation by Police (Travis, 2005) has been and continues to be essential (Williams, 2006a; Wunderstiz, Doecke, & Baldock, 2010; Yannis, Papadimitriou, & Antoniou, 2007). For example, concentrated general enforcement in Israel reduced serious injuries from more severe crashes (Hakkert, Gitelman, Cohen, Doveh, & Umansky, 2001), notwithstanding that there was an overall increase in crash incidences. Selective enforcement of seatbelt laws in Canada also resulted in both greater seatbelt use and decreased driver injuries (Jonah & Grant, 1985). Laws addressing blood alcohol concentration in particular are highly effective (Fell & Voas, 2006; McCartt, Helinga, & Kirley, 2009; Shults et

al., 2001). Roadside checks for drink driving not only reduce the rate of alcohol-involved crashes, but all crashes (Erke, Goldenbeld, & Vaa, 2009).

Research suggests however that male young drivers who are detected for a speeding offence are twice as likely to again be detected for a speeding offence compared to those who had not been detected for a speeding offence (Lawpoolsri, Li, & Braver, 2007), suggesting that enforcement alone is not sufficient to effect behaviour change in this risky group of drivers (Zaal, 1994). Such continued noncompliance appears to further contribute to the public perception that penalties should be more severe (Watson, 1997), particularly for young novice drivers. In addition, the persistence of risky behaviour even after personal experience of deterrence measures such as infringement notices suggests that researchers should consider other psychosocial factors that have been found to influence the risky behaviour of the young novice driver (Lonero & Clinton, 1988).

Frequently the efficacy of legislation is dependent upon the acceptance of the driving public (Foss, Stewart, & Reinfurt, 2001; Huq, Tyler, & Schulhofer, 2011; McCartt & Eichelberger, 2011). Most drivers recognise the importance and purpose of the legislation and support the implementation and enforcement of this legislation (Mitchell-Taverner et al., 2003). In addition, the effect of leniency by Police is not well understood. Preliminary qualitative research suggest that officers frequently use their discretion to verbally counsel noncompliant drivers rather than impose formal sanctions such as financial penalties and imposition of demerit points, particularly when drivers appear repentant (Schafer & Mastrofski, 2005). This appears problematic, particularly as research has identified a shorter duration between offences for drivers who did not receive a speeding citation at the time the offence was detected by the Police and those who did (Lawpoolsri et al., 2007). The incidences of warnings are likely to have reduced, however, with the utilisation of automatic detection devices such as fixed speed and red light cameras.

On-road Police presence has not been found to have a pervasive impact upon driver behaviour, however. Rather, the extant literature reports drivers exhibit compliance within the proximity of the enforcement site, returning to their noncompliant behaviour once they have left the immediate vicinity (Sisiopiku & Patel, 1999). This is suggested to be due to the perceived increased threat of detection, and therefore punishment (Galizio, Jackson, & O'Steele, 1979) in that vicinity specifically. In addition, only some risky behaviour appears to be vulnerable

to modification by Police presence (e.g., speed reduction, but no change in mobile phone or seatbelt use, Walter, Broughton, & Knowles, 2011). Further, Australian research findings suggest that greater nighttime enforcement of speed limits especially is required, and also in conjunction with education regarding speed-related crashes on road curves and during wet weather (Harrison, Triggs, & Pronk, 1999).

Legislation has also been fundamental for the safety of the young novice driver, including blood alcohol concentration laws which have reduced the injury and crashes for all drivers (Voas, Tippetts, & Fell, 2003; Zwerling & Jones, 1999). Legislation specifically targeting young drivers can also be effective. Lower age limits for supervised driving in Norway from 17 to 16 years did not result in reduced crash risk for the young novice (Sagberg, 2001), unless the novice undertook more supervised driving practice during this time (Sagberg & Gergersen, 2005), while benefits were found for young novice drivers in Sweden where a large proportion of young drivers undertook more practice (Gregersen et al., 2000). Graduated driver licensing has emerged as a particularly effective legislation, reducing the risks for the young novice driver. Enforcement of legislation such as graduated driver licensing laws has primarily relied upon the parents of the young novice driver (see 2.3.1).

A.3 Media campaigns

Road safety campaigns have generally been found to reduce crashes in the general driving environment, and success usually requires accompanying police enforcement (Cameron, Haworth, Oxley, Newstead, & Le, 1993; Phillips, Ulleberg, & Vaa, 2011; Tay, 2001). Researchers, however, argue against using crashes as the only measure of success, as they are highly variable in nature. Rather, they recommend before and after measures of the risky behaviours which commonly contribute to crashes (see also 2.2) (Hutchinson & Wundersitz, 2011).

Media campaigns have traditionally often used shock-tactics in a fear-based approach to ‘scare’ young drivers into behaving in a less-risky way. The use of fear-based media campaigns, including those campaigns specifically targeting young novice drivers, have been found to be unsuccessful for a number of reasons (Elliott, 1992). These include not being seen by the target audience, and they have been criticised for not demonstrating safer alternative behaviours. Whilst fear may attract attention, it is unlikely to result in cognitive and behavioural changes in young

drivers (Kohn, Goodstadt, Cook, Sheppard, & Chan, 1982; Lewis, Watson, & White, 2009). Young drivers advised they would be more likely to change their speeding behaviours rather than their drink-driving behaviours after being exposed to a range of anti-speeding and drink-driving campaigns; however, in some studies young male drivers alarmingly have reported they were more likely to drink-drive and to speed after their exposure to such campaigns (Glendon & Cernecca, 2003; Tay, 2005).

Research suggests that positively framing messages, and specifically including safer alternative behaviours, is more likely to result in positive behaviour change (Ramos et al., 2008; Sibley & Harre, 2009). A more recent approach has been to also target the passengers of the young novice driver, and a recent advertising campaign in Ireland targeted young women and highlighted the increased risk of travelling with a risky young male driver (RSA, 2010).

The 2007 ‘Pinkie’ campaign in New South Wales, Australia, utilised humour in an attempt to reduce young driver speeding behaviour via a social marketing campaign linking speeding with reduced masculinity in young male drivers. Risky driving behaviour was suggested to compensate for male genitalia that are disproportionally small. The small genitalia was represented by the little (‘pinkie’) finger which was prominently wiggled by females when they observed young males engaging in risky driving. The campaign was popular amongst the driving population in general and young persons in particular (Watsford, 2008), winning numerous advertising industry prizes (Clemmenger BBDO, 2009), and initial evaluations found the young driver was more likely to negatively comment on another young driver’s speeding. However this influence did not persist and there was also no difference in the incidence or frequency of speeding.

In a similar approach, a campaign in Tasmania targets the passengers of the young novice driver, encouraging them to ‘speak up’ if the driver is behaving in a risky way (Glaetzer, 2011). A comparable program targeting passengers by encouraging them not to get in the car if they do not trust the young driver was run in Victoria in 1997; however the effects of this program were not evaluated (Williams et al., 2007). The ‘Speak Out!” campaign in Norway also encouraged peer passengers to encourage their young driver to be safe, however whilst passenger deaths and injuries declined by nearly one third during the evaluation period, the fatality and injury rate of young drivers did not change (Elvik, 2000, cited in Ulleberg, 2004).

A.4 Incentive programs

Consistent with positive media campaigns, incentive programs have recently been developed to reduce the risky behaviour of young drivers and preliminary research suggests they may be effective in reducing distance driven and speeding during journeys (Greaves & Fifer, 2010). Five insurance companies in The Netherlands introduced a 'pay-as-you-drive scheme', in which the speeding behaviour of young drivers was monitored via global positioning systems (GPS) technology and compared to a control group. The young drivers in the scheme reported less mileage, and therefore time, speeding, and received lower insurance premiums as a result (Bolderdijk, Knockaert, Steg, & Verhoef, 2011). A Pay-as-You-Speed program which offered reduced insurance premiums (up to 30%) for compliance with speed limits which was monitored by an intelligent speed adaptation (ISA) system was effective whilst the ISA device was active. When the ISA was not active, participants returned to their prior speeding behaviour, suggesting that technology is effective only when active (Lahrmann, Agerholm, Tradisauskas, Berthelsen, & Harms, 2012).

A.5 Medical professionals

Medical professionals such as pediatricians and general practitioners are ideally positioned to assist in reducing the risky driving behaviour of young novices and to date may have been an underutilised resource (D'Angelo & Halpern-Felsher, 2008; D'Angelo, Halpern-Felsher, & Abraham, 2010). Medical professionals have been advised to counsel their adolescent patients regarding safe driving practices, and a majority of American pediatricians report discussing drink driving and using a seatbelt, with half discussing licensing laws during scheduled health reviews (Campbell et al., 2009). In addition, whilst the majority report they do not, physicians can also advise parents regarding safe driving practices, supervision of their adolescent (Meyer & D'Angelo, 2004), and implementing such conditions as stated in a certified driving agreement (D'Angelo et al., 2010). The PARTY program currently on trial in Melbourne, Victoria, encourages general practitioners to provide a brief intervention for their young patients who they identify are at risk from behaviour such as unsafe driving whenever they present to their medical practice (PARTY, 2009).

A.6 Peer support programs

Peer support programs predominantly comprise designated-driver programs, in which one of the occupants of the car abstains from drinking during the social event. Interventions such as 'Pick-a-Skipper' in Western Australia have been found to increase the numbers of persons to choose a designated driver before venturing to a drinking venue. Males, however, were less likely to select a designated driver, and this is particularly concerning as males engage in more risky driving behaviour. In addition, programs have been found to be more successful if combined with media campaigns (Boots & Midford, 1999). Colleges in the United States also support peer programs, such as the BACCHUS and GAMMA Peer Education Network in which peers are trained and then conduct injury prevention activities, including safe road use and abstaining from drink driving (Everett et al., 1999).

A.7 Parent monitoring programs

Parents are pivotal in the driving of their young children, from modeling safe driving behaviour and attitudes to their pre-Licence driver (discussed in Chapter Three), to providing access to a vehicle and supervising driving lessons for their licensed Learner driver (Simons-Morton & Ouimet, 2006; Simons-Morton, Ouimet, & Catalano, 2008). Many parents may be unaware of their important role and that they need to consider their child's driving even before they are licensed (Beck, Hartos, & Simons-Morton, 2002; Ruebenson, 2008; Williams et al., 2006). In particular, parents are ideally positioned to not only monitor but to also regulate their child's behaviour in the car before they are licensed, when they have a Learner licence and a Provisional driver's licence (Simons-Morton, 2007b). Rules regarding driving are not always clear to parents and their children alike, and haphazard enforcement of these rules when they do have them in place appears to weaken their effectiveness (Hartos, Shattuck, Simons-Morton, & Beck, 2004). Greater parental monitoring and restrictions is significantly related to less risky behaviour, crashes and offences by the young driver (Hartos, Eitel, Haynie, & Simons-Morton, 2000). Accordingly, various programs have been developed which target parents and encourage them to be active participants in the process of their child's development as a driver.

The Checkpoints program was developed in Connecticut and recognises that novice drivers are especially vulnerable when they drive under high-risk

circumstances – such as at night and with their friends as passengers – when they are first licensed to drive independently. Checkpoints aims for greater parental monitoring and imposition of driving restrictions during this time (Simons-Morton, Hartos, Leaf, & Preusser, 2006a, b; Simons-Morton et al., 2008), and parents and their teenaged novice children receive supporting materials highlighting the risks associated with the earliest stages of independent driving (Hartos, Simons-Morton, Beck, & Leaf, 2005). Parents and teens are encouraged to sign an agreement summarising the conditions under which the teen is allowed to drive, what they must do to preserve these driving privileges (such as maintaining academic achievement at school), and what the punishments will be for driving offences and crashes and other transgressions such as failing to keep school grades at agreed levels. Evaluations have demonstrated that the program is effective in helping parents impose limits on their children's driving (Simons-Morton, Hartos, & Leaf, 2002). In addition, whilst there was no difference in crash involvement, participating novices report less risky driving including offences at 3-, 6- and 12-month follow-ups (Simons-Morton et al., 2006b).

Parents also report a need for information regarding the risks for their novice driver (McCartt et al., 2007). Numerous research centres, independent transport and not-for profit organisations also encourage parents to be involved in the development of their novice driver child. For example, a^{2}omcic (2011) provides free online education and advice for parents in England. The Countdown2Drive program in the United States encourages 13- and 14-year olds and their parents to enter a driving agreement to promote the development of safe driving attitudes (Countdown2Drive, 2010). The Centre for Injury Research and Prevention (CIRP) in Philadelphia also provides free online information and materials for schools, workplaces, and specifically addresses communication of driving risks and safe behaviours between young drivers and their parents (CIRP, 2011).

A.8 Training and education

Driver training focuses on teaching young novices driving techniques, ranging from basic vehicle control skills to emergency maneuvers such as skid control, and is undertaken in a vehicle. Driver education – frequently coupled with driver training – aims to inform pre-Licence drivers and young novices of driving rules and driving risks such as carrying their friends as passengers and not following

the road rules, and is typically undertaken in a classroom environment (OECD, 2006). Driver education and training has been a controversial topic in the domain of young novice drivers for more than three decades (Lonero & Mayhew, 2010). Training and education is commonly believed by the wider community to improve young driver safety (Watson, 1997; Williams & Ferguson, 2004) and is therefore popular amongst the general public (Senserrick, 2007), however there is a dearth of methodologically-sound evaluations (Elvik & Vaa, 2004) and no evidence of positive effects has been found (Christie, 2001; Watson, 2003).

Whilst on-road driver training is fundamental during the Learner period, after controlling for driving exposure, there was no difference in the rates of offences, near-misses, and crashes of young novice drivers in Montana who received defensive vehicle handling training and those who did not (Stanley & Mueller, 2010). Completing a braking and avoidance maneuver training course increased young novice driver confidence by a larger margin than for novices who completed an insight training course, whilst no difference in actual driving skill was detected (Gregersen, 1996). Lower offence rates, but no difference in crash involvement, was found for young drivers who participated in ‘Practice’ and ‘ProDrive’ education programs in New Zealand (Lewis-Evans & Lukkien, 2007). Whilst offence detection has been found to be lower for drivers who engaged in post-licence defensive driving courses, no reductions in crashes have been found (Lund & Williams, 1985). In addition, in some jurisdictions, participation in training and education programs as a Learner allows the novice to drive independently sooner (e.g., in Quebec, Canada, 12 certified hours of driving lessons from approved driving schools shortens the Learner period by 4 months, Hirsch, Maag, & Laberge-Nadeau, 2006), and this is problematic because as noted in 2.2.1.1.1, younger age at licensure is associated with increased crash risks for the young driver (McCartt et al., 2009).

Driver training and education programs have also featured in high school curricula around the world for decades. There is no conclusive evidence verifying the efficacy of these programs at this time (Vernick et al., 1999), and such courses have actually been found to increase licensing rates, and at an earlier age, amongst teens, placing them at increased risk on the road (Lund, Williams, & Zador, 1986). Driver training and education programs traditionally focus upon vehicle-handling and emergency driving skills, and some of these programs have been found to result in more crashes as they appear to make the driver more accepting of risk (Hedlund,

2007; Raftery & Wundersitz, 2011). It is suggested this may be due to a conflict in goals: instructors believe that the training will improve novice hazard detection skills, whilst participating drivers believe that the training will improve their driving skills more broadly (Katila, Keskinen, & Hatakka, 1996).

There is an extensive multitude of education programs with different content, teaching approaches, and targeted participants, often without any theoretical foundation (Lonero, 2008). Frequently education and training providers promote their programs to parents and their novice driver children without conducting rigorous empirical evaluations to support their assertions of increased road safety and decreased risk to the novice (Heenan, 2009). Other evaluations frequently do not compare the behaviours of control groups with the behaviour of their participants (e.g., Carstensen, 2002, cited in Lonero & Mayhew, 2010) and this makes rigorous empirical evaluation of their efficacy problematic. Evaluations are further complicated by the wide variety in program content, age eligibility, instructional method, and opportunities for practice (Fuller, 2002). A more holistic approach to driver education is provided by the Goals for Driver Education (GDE) framework, in which essential context of driving knowledge and skills, risk increasing factors, and driver self-evaluation and awareness are addressed within a hierarchy of goals for life and skills for living, the journey context, mastery of traffic situations, and vehicle maneuvering (e.g., see Shope, 2006), however comprehensive evaluation results are not yet available.

As noted in Chapter Two, underdeveloped hazard perception skills contribute to the crashes, offences, and injuries of young novice drivers, who need time and opportunities to develop these skills. Hazard perception training, scanning for risks, and insight training have emerged in recent years, including on-road and advanced simulator training, and preliminary investigations suggest these may be a potentially effective countermeasure (Fisher, Pollatsek, & Pradhan, 2006; Senserrick & Swinburne, 2001; White et al., 2011). Simulator-based hazard perception training programs with a computer-based interactive component highlighting where the risks are have been found to significantly increase the eye gaze at potential hazards compared to control drivers four days after the intervention (Pradhan, Fisher, & Pollatsek, 2006). Web-based hazard perception training programs have also been developed (Hogge & Sherlock, 2005), however evaluation results are unavailable.

Road safety researchers acknowledge that governments frequently consider the benefits of mobility for young novice drivers who are children of their constituents, rather than the best practice of licensing programs (Bates et al., 2010a; Hirsch, 2003; Mayhew, 2006). In addition, the media is pivotal in their representation of the behaviours of drivers (Watson, 2007) and changes to licensing programs (Hinchcliff, Chapman, Ivers, Senserrick, & Du, 2010). Best practice guidelines for driver training and education highlight the importance of incorporating self-awareness and self-monitoring (Bailey, 2009; Mayhew & Simpson, 2002). Recently, education programs have considered the nature and extent of psychosocial contributors to crashes and the role of protective behavioural strategies in risky behaviour (e.g., Borden et al., 2011; Botvin, Griffin, Diaz, & Ifill-Williams, 2001; Liourta & van Empelen, 2008). Whilst no difference in offences were detected between groups of young novice drivers, participants of extended resilience-focused education in New South Wales were found to have a 44% lower relative risk of crash than drivers who participated in a one day driving-risk workshop (Senserrick et al., 2009). In addition, the impact of driver education may be influenced by the driving experience of the young novice (Zhao et al., 2006).

The responsibility of being a driver has recently been emphasised (Rismark & Solvberg, 2007). 'Atout-Route' is a French program targeting young people driving under the influence of fatigue, alcohol and illicit drugs, through education of the risks associated with this behaviour whilst highlighting their responsibility in such circumstances. Whilst no significant difference was found in crash rates, underreporting of crashes was suspected (Carcaillon, Salmi, & Atout-Rouge Evaluate Group, 2005). In addition, driver education programs have begun to target the pre-Licence driver, recognising that many attitudes towards driving are ingrained long before the child is old enough to actually apply for a Learner licence (Berg, 2006; Carcary, 2002). Such programs increase the involvement of parents (Senserrick, 2007), acknowledging the important role parents play (Berg, 2006). In addition, parents report they would participate in teenage driver education courses (Hartos & Huff, 2008).

A controversial approach is to allow the young novice driver to experience driving drunk in controlled circumstances, such as the Dutch 'Alcohol-free on the road' program. Novices who tried drink driving reported less crash involvement and greater awareness of the risks associated with drink driving than those in the control

group who did not. In addition, official offence records revealed the control group had significantly more alcohol-related offences (Brookhuis, de Waard, Steyvers, & Bijsterveld, 2011). Programs also attempt to develop safe passengers (Buckley & Sheehan, 2007), such as the 10-week 'You Hold the Key' program in Ohio. Resistance skills are also learnt through interactive lessons, in addition to discussions of driving risks (King, Vidourek, Love, Wegley, & Alles-White, 2008). Another program, JourneySafe, educates young drivers and their parents about driving risks, driver distraction and inattention, and negative passenger influences whilst encouraging 'positive' peer pressure in particular (JourneySafe, 2009).

A.9 Rehabilitation, remediation and retraining programs

Rehabilitation, remediation and retraining programs of various forms have been operationalised in a number of jurisdictions in an attempt to reform the risky driving behaviours (and sometimes the risky driving attitudes) of young novice drivers, who have been identified through offence-detection or crash involvement. The extant literature highlights that the majority of these programs have not been subject to sound evaluation, however, and the programs that have undergone some evaluation generally have been found to have limited ability to change driver behaviour and/or attitudes (e.g., Morrison, Petticrew & Thomson, 2003).

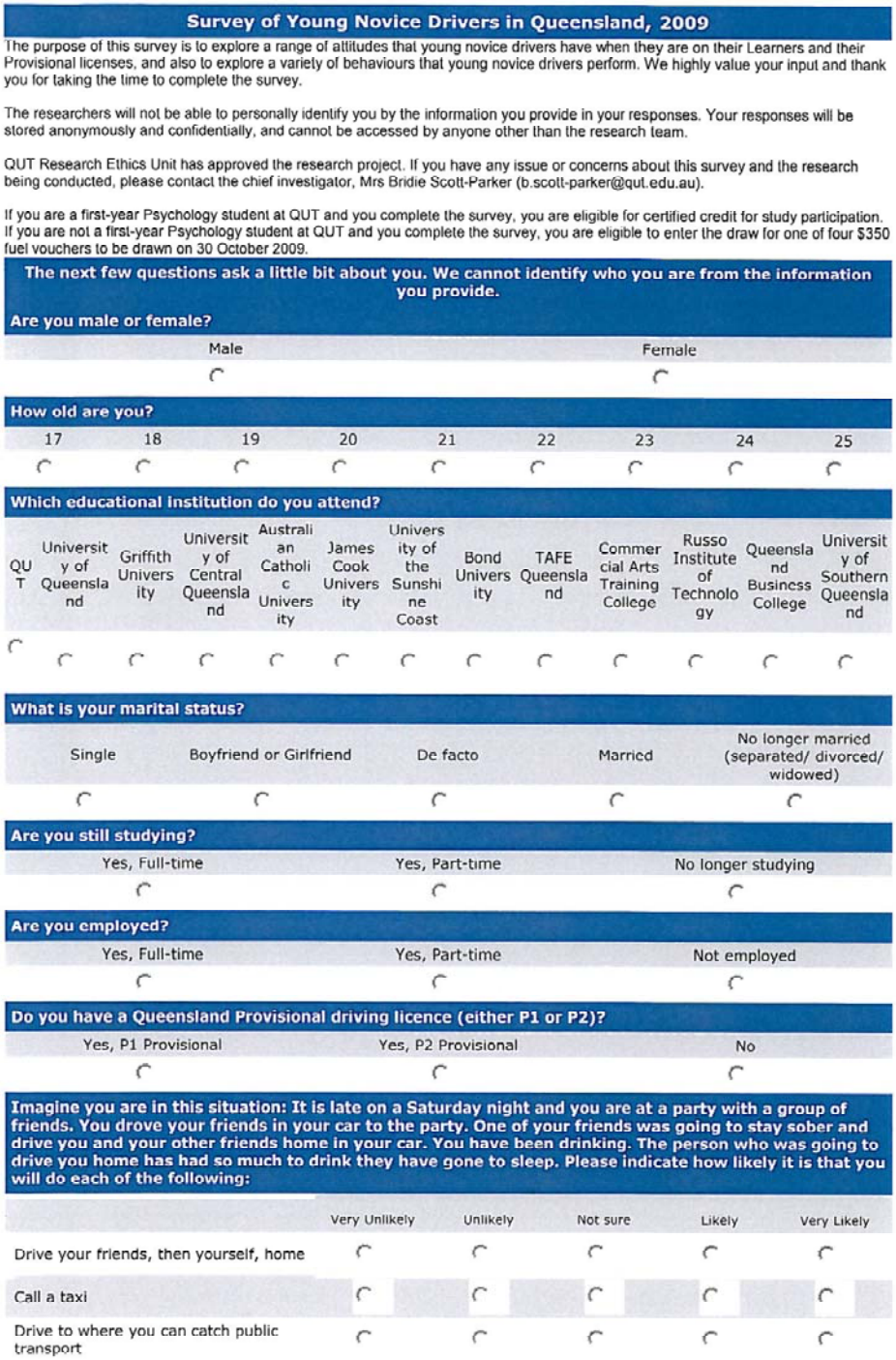
Rehabilitation programs typically focus upon changing the behaviours and/or attitudes of drivers as part of traffic offender management. In-car technology (see also A.1) is frequently used in such rehabilitation programs. To illustrate, alcohol ignition interlocks have been incorporated in programs for recidivist drink driving offenders (ETSC, 2008), and have been found to be effective in reducing drink driving re-arrest and reconviction rates (e.g., Coben & Larkin, 1999; Morrison et al., 2003). Evaluations consistently reveal, however, that the interlocks are only effective whilst they are fitted to the vehicle (Willis, Lybrand & Bellamy, 2004).

Remediation programs generally attempt to improve driver behaviour through highlighting the benefits of safe driving behaviour and the risks associated with unsafe driving behaviour (e.g., remedial driver education, Coppin, 1962, 1965, as cited in Ker et al., 2008). These programs have operationalised mail-out of education materials, group and individual discussion, presentations, films, and counseling efforts. Whilst some reviews have found no evidence that such remediation programs are effective in reducing the participants' rates of offence

detection, crash, and injury-crash (Ker et al., 2008), there is some evidence that these interventions can effect a small reduction in post-remediation crash-involvement and offence-detection (Masten & Peck, 2004). The greatest benefit for these interventions appears to arise from programs which incorporate licence suspension or disqualification, suggesting that the identified benefits may be related to reduced driving exposure during the sanctioned period (Masten & Peck, 2004).

Retraining programs focus upon driver 'improvement' and education, and may involve class-room and in-car efforts. Whilst some programs report statistically significant reductions in post-intervention offence-detection, it is suggested that this is primarily due to biases in participant selection and in trial evaluations. Rigorous evaluation, in contrast, found no reductions in post-training offence-detection and crash-involvement for retraining programs (e.g., Ker et al., 2008; Morrison et al., 2003). Since 1994 in South Australia, risky young drivers (e.g., detected for an alcohol- or speed-related offence, and/or subject to licence disqualification) can choose to pay a fine or to participate in a driver intervention program which uses facilitated group discussions to emphasise the risks and the road trauma associated with unsafe road use. This Driver Improvement Program has not been found to reduce participant crash involvement post-intervention, however, and suggestions for improving the program have been made (e.g., incorporating psychological interventions) (Wundersitz & Hutchinson, 2006).

Appendix B: The survey of Stage One: Foundation research



Survey of Young Novice Drivers in Queensland, 2009

The purpose of this survey is to explore a range of attitudes that young novice drivers have when they are on their Learners and their Provisional licenses, and also to explore a variety of behaviours that young novice drivers perform. We highly value your input and thank you for taking the time to complete the survey.

The researchers will not be able to personally identify you by the information you provide in your responses. Your responses will be stored anonymously and confidentially, and cannot be accessed by anyone other than the research team.

QUT Research Ethics Unit has approved the research project. If you have any issue or concerns about this survey and the research being conducted, please contact the chief investigator, Mrs Bridie Scott-Parker (b.scott-parker@qut.edu.au).

If you are a first-year Psychology student at QUT and you complete the survey, you are eligible for certified credit for study participation. If you are not a first-year Psychology student at QUT and you complete the survey, you are eligible to enter the draw for one of four $350 fuel vouchers to be drawn on 30 October 2009.

The next few questions ask a little bit about you. We cannot identify who you are from the information you provide.

Are you male or female?

Male ○ Female ○

How old are you?

17 ○ 18 ○ 19 ○ 20 ○ 21 ○ 22 ○ 23 ○ 24 ○ 25 ○

Which educational institution do you attend?

QUT ○ University of Queensland ○ Griffith University ○ University of Central Queensland ○ Australian Catholic University ○ James Cook University ○ University of the Sunshine Coast ○ Bond University ○ TAFE Queensland ○ Commercial Arts Training College ○ Russo Institute of Technology ○ Queensland Business College ○ University of Southern Queensland ○

What is your marital status?

Single ○ Boyfriend or Girlfriend ○ De facto ○ Married ○ No longer married (separated/ divorced/ widowed) ○

Are you still studying?

Yes, Full-time ○ Yes, Part-time ○ No longer studying ○

Are you employed?

Yes, Full-time ○ Yes, Part-time ○ Not employed ○

Do you have a Queensland Provisional driving licence (either P1 or P2)?

Yes, P1 Provisional ○ Yes, P2 Provisional ○ No ○

Imagine you are in this situation: It is late on a Saturday night and you are at a party with a group of friends. You drove your friends in your car to the party. One of your friends was going to stay sober and drive you and your other friends home in your car. You have been drinking. The person who was going to drive you home has had so much to drink they have gone to sleep. Please indicate how likely it is that you will do each of the following:

	Very Unlikely	Unlikely	Not sure	Likely	Very Likely
Drive your friends, then yourself, home	○	○	○	○	○
Call a taxi	○	○	○	○	○
Drive to where you can catch public transport	○	○	○	○	○

Call family to collect you	○	○	○	○	○
Drive home	○	○	○	○	○
Ask to stay over	○	○	○	○	○
Sleep in your car	○	○	○	○	○
Drive to a friends' house to stay the night	○	○	○	○	○

Please answer the following questions as either 'Yes' or 'No'. There are no right or wrong answers.

	Yes	No
Do you like displaying your physical activities even though this may involve danger?	○	○
When you are with a group do you have difficulties selecting a good topic to talk about?	○	○
Do you often refrain from doing something you like in order not be rejected or disapproved of by others?	○	○
Are you a shy person?	○	○
Do you spend a lot of your time on obtaining a good image?	○	○
Do you like to compete and do everything you can do to win?	○	○
Comparing yourself to people you know, are you afraid of many things?	○	○
Do you think a lot before complaining in a restaurant if your meal is not well-prepared?	○	○
Are you interested in money to the point of being able to do risky jobs?	○	○
Are you competitive in all of your activities?	○	○
Whenever you can do you avoid going to unknown places?	○	○
Does the good prospect of obtaining money motivate you strongly to do some things?	○	○
Whenever possible do you avoid demonstrating your skills for fear of being embarrassed?	○	○
Is it difficult for you to telephone someone you do not know?	○	○
Are you easily discouraged in difficult situations?	○	○
Do you like being the centre of attention at a party or a social gathering?	○	○
Would you be bothered if you had to return to a store when you noticed you were given the wrong change?	○	○
Is if often difficult for you to fall asleep when you think about things you have done or must do?	○	○
Do you often refrain from doing something because you are afraid of it being illegal?	○	○
Are you often worried about things you said or did?	○	○

When you start to gamble, such as play the Pokies, is it often difficult for you to stop?		
Do you, on a regular basis, think that you would do more things if it was not for your insecurity or fear?		
As a child did you do a lot of things to get people's approval?		
Does your attention easily stray from your work in the presence of an attractive stranger?		
Do you often meet people you find physically attractive?		
Generally do you pay more attention to threats than to pleasant events?		
Do you generally try to avoid speaking in public?		
Do you prefer not to ask for something when you are not sure you will obtain it?		
As a child were you troubled by punishments at home or in school?		
Do you like to take drugs or drink alcohol because of the pleasure you get from them?		
Do you often give in when you know you can avoid an argument with a person or an organisation?		
Do you need people to show their affection for you all the time?		
Do you often take the opportunity to pick up people you find attractive?		
Would you like to be a socially powerful person?		
Are you often afraid of new or unexpected situations?		
Are there a large number of objects or sensations that remind you of pleasant events?		
Do you often have trouble resisting the temptation of doing forbidden things?		
Is it easy for you to associate tastes and smells to very pleasant events?		
Are you frequently encouraged to act by the possibility of being valued in your work, in your studies, with your friends or with your family?		
Do you generally give preference to those activities that imply an immediate gain?		
Do you often find yourself worrying about things to the extent that performance in intellectual abilities is impaired?		
Does the possibility of social advancement move you to action, even if this involves not playing fair?		
Do you sometimes do things for quick gains?		
Would it be difficult for you to ask your boss for a raise?		
When you are in a group do you try to make your opinions the most intelligent or the funniest?		

In tasks that you are not prepared for, do you attach great importance to the possibility of failure?	○	○
Do you often refrain from doing something because of your fear of being embarrassed?	○	○
Do you often do things to be praised?	○	○

Please imagine you are in this situation: You are driving late at night, and you come to an intersection with a red light. You can't see any police or camera. Please indicate how likely it is that you will:

	Very Unlikely	Unlikely	Not sure	Likely	Very Likely
Stop at the red light	○	○	○	○	○
Slow down for the red light but keep driving slowly	○	○	○	○	○
Drive through the red light	○	○	○	○	○
Speed up when you get to the red light	○	○	○	○	○

These next questions ask about the way you feel about yourself and a variety of activities. Please answer these as 'True' or 'False'

	True	False
I like 'wild' uninhibited parties	○	○
I sometimes do 'crazy' things just for fun	○	○
I get restless when I spend too much time at home	○	○
I would like the kind of life where one is on the move and travelling a lot, with lots of change and excitement	○	○
I enjoy getting into new situations where I can't predict how things will turn out	○	○
I would like to try bungee jumping	○	○
I often do things on impulse	○	○
I like doing things just for the thrill of it	○	○
I usually think about what I am going to do before doing it	○	○
I would like to take off on a trip with no pre-planned or definite routes or timetables	○	○
I prefer friends who are excitingly unpredictable	○	○
I like to explore a strange city or section of town by myself, even if it means getting lost	○	○
I would like to explore strange places	○	○
I would love to have new and exciting experiences, even if they are illegal	○	○
I very seldom spend much time on the details of planning ahead	○	○
I sometimes like to do things which are a little frightening	○	○
I'll try anything once	○	○
Before I begin a complicated job, I make careful plans	○	○

I am an impulsive person	○	○
I tend to begin a new job without much advance planning on how I will do it	○	○
I tend to change interests frequently	○	○
I often get so carried away by new and exciting things and ideas that I never think of possible complications	○	○

Imagine that you are in this situation. You are driving at the speed limit with friends in the car. You can't see any police or cameras around. Your friends suggest you drive faster. How likely is it that you will

	Very Unlikely	Unlikely	Not sure	Likely	Very Likely
Go a fair bit faster?	○	○	○	○	○
Go a little bit faster?	○	○	○	○	○
Go a lot faster	○	○	○	○	○
Go a lot faster?	○	○	○	○	○
Stick to the speed limit?	○	○	○	○	○

Think back to your driving experiences whilst you were on your Learner licence. Please rate the following behaviours done by young novice drivers based on your experiences as a Learner driver.

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You drove without having a destination in mind	○	○	○	○	○
Your driving was affected by emotions like anger or frustration	○	○	○	○	○
You overtook a car on the left	○	○	○	○	○
You drove at night	○	○	○	○	○
You drove at dusk or dawn	○	○	○	○	○
You went more than 20 km/hr over the speed limit (e.g. 60 in a 40, 100 in an 80)	○	○	○	○	○
You drove at peak times in the morning and afternoon	○	○	○	○	○
You drive without a qualified supervisor	○	○	○	○	○
Your passengers didn't wear seatbelts	○	○	○	○	○
You spoke on a mobile that you held in your hands	○	○	○	○	○
You drove after taking an illicit drug such as marijuana or ecstasy	○	○	○	○	○
You drove on the weekend	○	○	○	○	○
You drove a car that was more than 10 years old	○	○	○	○	○
You carried more passengers than could legally fit in your car	○	○	○	○	○
Your passengers had their mobile on loudspeaker	○	○	○	○	○
You didn't always wear your seatbelt	○	○	○	○	○
You made a lane change when there probably wasn't enough room to do so	○	○	○	○	○

You found yourself driving when you were really "pumped up"	○	○	○	○	○
You didn't always display your novice plates	○	○	○	○	○
You went up to 10 km/hr over the speed limit (e.g. 65 in a 60, 105 in a 100)	○	○	○	○	○
You drove with the stereo up really loud	○	○	○	○	○
You sped up when the lights went yellow	○	○	○	○	○
You drove a high-powered vehicle	○	○	○	○	○
Your car was full of your friends as passengers	○	○	○	○	○
You drove over the white centre line when you weren't overtaking	○	○	○	○	○
You drove without a valid licence because you hadn't applied for one yet or it had been suspended	○	○	○	○	○
You sent or replied to a text while driving	○	○	○	○	○
You didn't stop at a stop sign or a red light	○	○	○	○	○
You drove when you thought you may have been over the legal alcohol limit	○	○	○	○	○
You didn't give way to traffic, e.g. already on the roundabout or at a give way sign	○	○	○	○	○
You drove a small car such as a hatchback	○	○	○	○	○
You went 10-20 km/hr over the speed limit (e.g. 72 in a 60, 112 in a 100)	○	○	○	○	○
You drove in the rain	○	○	○	○	○
You drove when you knew you were tired	○	○	○	○	○

Keep thinking back to your driving experiences whilst you were on your Learner licence. Please rate the following behaviours done by young novice drivers based on your experiences as a Learner driver.

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You raced with other drivers	○	○	○	○	○
You misjudged the speed of an oncoming vehicle	○	○	○	○	○
You misjudged the gap when you were turning right	○	○	○	○	○
You sped at night on roads that were not well lit	○	○	○	○	○
You misjudged the gap when you were overtaking another vehicle	○	○	○	○	○
You drove for a sense of freedom	○	○	○	○	○
You drove so you could feel independent	○	○	○	○	○
You turned right into the path of another vehicle	○	○	○	○	○
If there was no red light camera, you drove through intersections on a red light	○	○	○	○	○
You misjudged the speed when you were exiting a main road	○	○	○	○	○
You allowed your driving style to be influenced by what mood you were in	○	○	○	○	○

You drove to feel powerful	○	○	○	○	○
You deliberately sped when overtaking	○	○	○	○	○
You drove to show you were now an adult	○	○	○	○	○
You misjudged the stopping distance you needed	○	○	○	○	○
You drove so you could gain status amongst your friends	○	○	○	○	○
You changed your mind about your destination mid-journey	○	○	○	○	○
You drove over the speed limit in areas where it was unlikely there was a radar or speed camera	○	○	○	○	○
You travelled in the right lane on multi-lane highways	○	○	○	○	○
You followed someone who had cut you off	○	○	○	○	○
You raced out of an intersection when the light went green	○	○	○	○	○
You did an illegal U-Turn	○	○	○	○	○
You overtook a car illegally	○	○	○	○	○
You drove faster if you were in a bad mood	○	○	○	○	○
You carried more passengers than there were seatbelts for in your car	○	○	○	○	○
You didn't wear a seatbelt if it was only for a short trip	○	○	○	○	○
You went too fast around a corner	○	○	○	○	○
You carried your friends as passengers at night	○	○	○	○	○
You drove as a way of blowing off steam	○	○	○	○	○
You entered the road in front of another vehicle	○	○	○	○	○
You drove to relax	○	○	○	○	○
You drove so you could see your friends easily	○	○	○	○	○
You went for a drive with your mates giving you directions to where they wanted to go	○	○	○	○	○
You yelled or used rude gestures at another driver who had cut you off	○	○	○	○	○
You didn't always indicate when you were changing lanes	○	○	○	○	○
You missed your exit or turn	○	○	○	○	○
You took chances for the fun of it when driving in traffic	○	○	○	○	○

These items are just to get a measure of how you have been feeling lately. All your responses are confidential, and we cannot identify you from anything you enter in this survey. Please answer the following questions from 'None of the time' to 'All of the time'. In the past four weeks, about how often did you

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Feel tired out for no good reason	○	○	○	○	○
Feel nervous	○	○	○	○	○

Feel so nervous that nothing could calm you down	○	○	○	○	○
Feel hopeless	○	○	○	○	○
Feel restless or fidgety	○	○	○	○	○
Feel so restless that you could not sit still	○	○	○	○	○
Feel depressed	○	○	○	○	○
Feel that everything is an effort	○	○	○	○	○
Feel so sad that nothing could cheer you up	○	○	○	○	○
Feel worthless	○	○	○	○	○

Now please think about your driving experiences since you have been on your Provisional licence. Rate the following behaviours done by young novice drivers based on your experiences as a Provisional driver.

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You drove a high-powered vehicle	○	○	○	○	○
You drove when you knew you were tired	○	○	○	○	○
You spoke on a mobile that you held in your hands	○	○	○	○	○
You drove in the rain	○	○	○	○	○
You carried more passengers than could legally fit in your car	○	○	○	○	○
You drove when you thought you may have been over the legal alcohol limit	○	○	○	○	○
You drove without having a destination in mind	○	○	○	○	○
Your passengers didn't wear seatbelts	○	○	○	○	○
You drove without a valid licence because you hadn't applied for one yet or it had been suspended	○	○	○	○	○
Your car was full of your friends as passengers	○	○	○	○	○
You didn't always display your novice plates	○	○	○	○	○
You didn't stop at a stop sign or a red light	○	○	○	○	○
You made a lane change when there probably wasn't enough room to do so	○	○	○	○	○
You drove over the white centre line when you weren't overtaking	○	○	○	○	○
You sped up when the lights went yellow	○	○	○	○	○
Your driving was affected by negative emotions such as anger or frustration	○	○	○	○	○
You drove on the weekend	○	○	○	○	○
You found yourself driving when you were really "pumped up"	○	○	○	○	○
You went 10-20 km/hr over the speed limit (e.g. 72 in a 60, 112 in a 100)	○	○	○	○	○
You drove at dusk or dawn	○	○	○	○	○
You didn't give way to traffic, e.g. already on the roundabout or at a give	○	○	○	○	○

way sign					
You drove a car that was more than 10 years old	○	○	○	○	○
You drove at night	○	○	○	○	○
You drove with the stereo up really loud	○	○	○	○	○
You went more than 20 km/hr over the speed limit (e.g. 60 in a 40, 100 in an 80)	○	○	○	○	○
You didn't always wear your seatbelt	○	○	○	○	○
You drove a small car such as a hatchback	○	○	○	○	○
You overtook a car on the left	○	○	○	○	○
You drove at peak times in the morning and afternoon	○	○	○	○	○
You went up to 10 km/hr over the speed limit (e.g. 65 in a 60, 105 in a 100)	○	○	○	○	○
You drove after taking an illicit drug such as marijuana or ecstasy	○	○	○	○	○
You sent or replied to a text while driving	○	○	○	○	○
Your passengers had their mobile on loudspeaker	○	○	○	○	○

Keep thinking about your driving experiences whilst you have been on your Provisional licence. Rate the following behaviours done by young novice drivers based on your experiences as a Provisional driver.

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You didn't always indicate when you were changing lanes	○	○	○	○	○
You travelled in the right lane on multi-lane highways	○	○	○	○	○
You followed someone who had cut you off	○	○	○	○	○
You yelled or used rude gestures at another driver who had cut you off	○	○	○	○	○
You misjudged the stopping distance you needed	○	○	○	○	○
You misjudged the speed of an oncoming vehicle	○	○	○	○	○
You turned right into the path of another vehicle	○	○	○	○	○
You drove to feel powerful	○	○	○	○	○
You entered the road in front of another vehicle	○	○	○	○	○
You deliberately sped when overtaking	○	○	○	○	○
You misjudged the speed when you were exiting a main road	○	○	○	○	○
You went too fast around a corner	○	○	○	○	○
You missed your exit or turn	○	○	○	○	○
You raced out of an intersection when the light went green	○	○	○	○	○
You drove so you could gain status amongst your friends	○	○	○	○	○
You drove as a way of blowing off steam	○	○	○	○	○

You drove to relax	○	○	○	○	○
You sped at night on roads that were not well lit	○	○	○	○	○
You drove so you could feel independent	○	○	○	○	○
You went for a drive with your mates giving you directions to where they wanted to go	○	○	○	○	○
You didn't wear a seatbelt if it was only for a short trip	○	○	○	○	○
You raced with other drivers	○	○	○	○	○
You carried your friends as passengers at night	○	○	○	○	○
You did an illegal U-Turn	○	○	○	○	○
You overtook a car illegally	○	○	○	○	○
You changed your mind about your destination mid-journey	○	○	○	○	○
You drove over the speed limit in areas where it was unlikely there was a radar or speed camera	○	○	○	○	○
If there was no red light camera, you drove through intersections on a red light	○	○	○	○	○
You drove faster if you were in a bad mood	○	○	○	○	○
You misjudged the gap when you were overtaking another vehicle	○	○	○	○	○
You allowed your driving style to be influenced by what mood you were in	○	○	○	○	○
You misjudged the gap when you were turning right	○	○	○	○	○
You took chances for the fun of it when driving in traffic	○	○	○	○	○
You drove so you could see your friends easily	○	○	○	○	○
You drove for a sense of freedom	○	○	○	○	○
You drove to show you were now an adult	○	○	○	○	○
You carried more passengers than you were allowed to under the graduated driver licensing restrictions passenger limits	○	○	○	○	○
You carried more passengers than there were seatbelts for in your car	○	○	○	○	○

Have you ever been in a car crash when you were the driver, whether you were the one at-fault or not?

○ Yes

○ No

Have you ever been caught by the police (this includes a red-light camera or a speed camera) for any driving offences?

○ Yes

○ No

Imagine you are in this situation: You are at a party and it is just after midnight. You are on a provisional P1 licence and you are about to go home. Your friends ask you for a lift in your car. How likely is it that you will:

	Very Unlikely	Unlikely	Not sure	Likely	Very Likely
Tell them to take a taxi	○	○	○	○	○
Give them a lift	○	○	○	○	○
Tell them to get a lift with someone else	○	○	○	○	○
Tell them to catch a bus or walk home	○	○	○	○	○
Tell them to stay over at the party	○	○	○	○	○
Tell them no	○	○	○	○	○

How many hours do you spend with your family each week?

< 10 hours	10 - 20 hours	20 - 30 hours	30 - 40 hours	> 40 hours
○	○	○	○	○

How many hours do you spend with your friends each week?

< 10 hours	10 - 20 hours	20 - 30 hours	30 - 40 hours	> 40 hours
○	○	○	○	○

Please indicate how important each of the following are:

	Not very important	Important	Very important	Does not apply
How important is it that you be promoted or receive a raise at work?	○	○	○	○
How important is it that you do a good job at your workplace?	○	○	○	○
How important is it that you get a degree or some other formal qualification like a traineeship?	○	○	○	○
How important is it that you get good grades at school, TAFE or university?	○	○	○	○
How important is it that you finish your current studies?	○	○	○	○
How important is that your friends approve of your driving behaviours and attitudes?	○	○	○	○
How important is it that your father approves of your driving behaviours and attitudes?	○	○	○	○
How important is it that your mother approves of your driving behaviours and attitudes?	○	○	○	○

Think about the driving that you will do over the next year.

	Definitely will not						Definitely will
How likely is that you will bend any road rules, including the graduated driver licensing restrictions for the Provisional licence, in the future?	○	○	○	○	○	○	○

Submit

Appendix C: Small group and individual interview questions

(1) What are the advantages of bending or breaking the road rules?

(2) What are the disadvantages of bending or breaking the road rules?

(3) How would your friends react if you bent or broke the road rules?

(4) How would your parents react if you bent or broke the road rules?

(5) How would the Police react if you bent or broke the road rules?

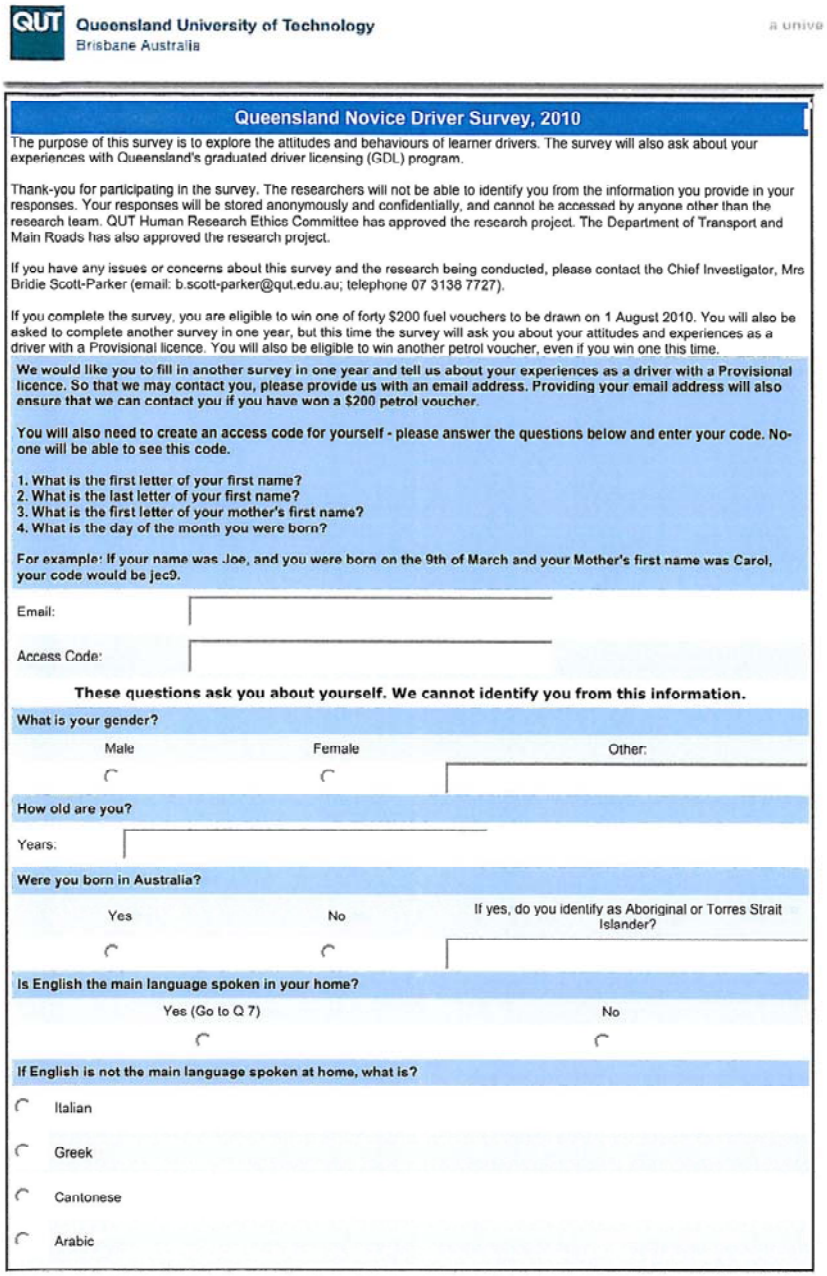
(6) Do you drive like your parents? In what way?

(7) Do you drive like your friends? In what way?

(8) How much influence do your friends have over the way you drive? In what way?

(9) How much influence do your parents have over the way you drive? In what way?

Appendix D: The survey of Stage Two: Learner Driver Survey



Queensland University of Technology
Brisbane Australia

Queensland Novice Driver Survey, 2010

The purpose of this survey is to explore the attitudes and behaviours of learner drivers. The survey will also ask about your experiences with Queensland's graduated driver licensing (GDL) program.

Thank-you for participating in the survey. The researchers will not be able to identify you from the information you provide in your responses. Your responses will be stored anonymously and confidentially, and cannot be accessed by anyone other than the research team. QUT Human Research Ethics Committee has approved the research project. The Department of Transport and Main Roads has also approved the research project.

If you have any issues or concerns about this survey and the research being conducted, please contact the Chief Investigator, Mrs Bridie Scott-Parker (email: b.scott-parker@qut.edu.au; telephone 07 3138 7727).

If you complete the survey, you are eligible to win one of forty $200 fuel vouchers to be drawn on 1 August 2010. You will also be asked to complete another survey in one year, but this time the survey will ask you about your attitudes and experiences as a driver with a Provisional licence. You will also be eligible to win another petrol voucher, even if you win one this time.

We would like you to fill in another survey in one year and tell us about your experiences as a driver with a Provisional licence. So that we may contact you, please provide us with an email address. Providing your email address will also ensure that we can contact you if you have won a $200 petrol voucher.

You will also need to create an access code for yourself - please answer the questions below and enter your code. No-one will be able to see this code.

1. What is the first letter of your first name?
2. What is the last letter of your first name?
3. What is the first letter of your mother's first name?
4. What is the day of the month you were born?

For example: If your name was Joe, and you were born on the 9th of March and your Mother's first name was Carol, your code would be jec9.

Email:

Access Code:

These questions ask you about yourself. We cannot identify you from this information.

What is your gender?

Male ○ Female ○ Other:

How old are you?

Years:

Were you born in Australia?

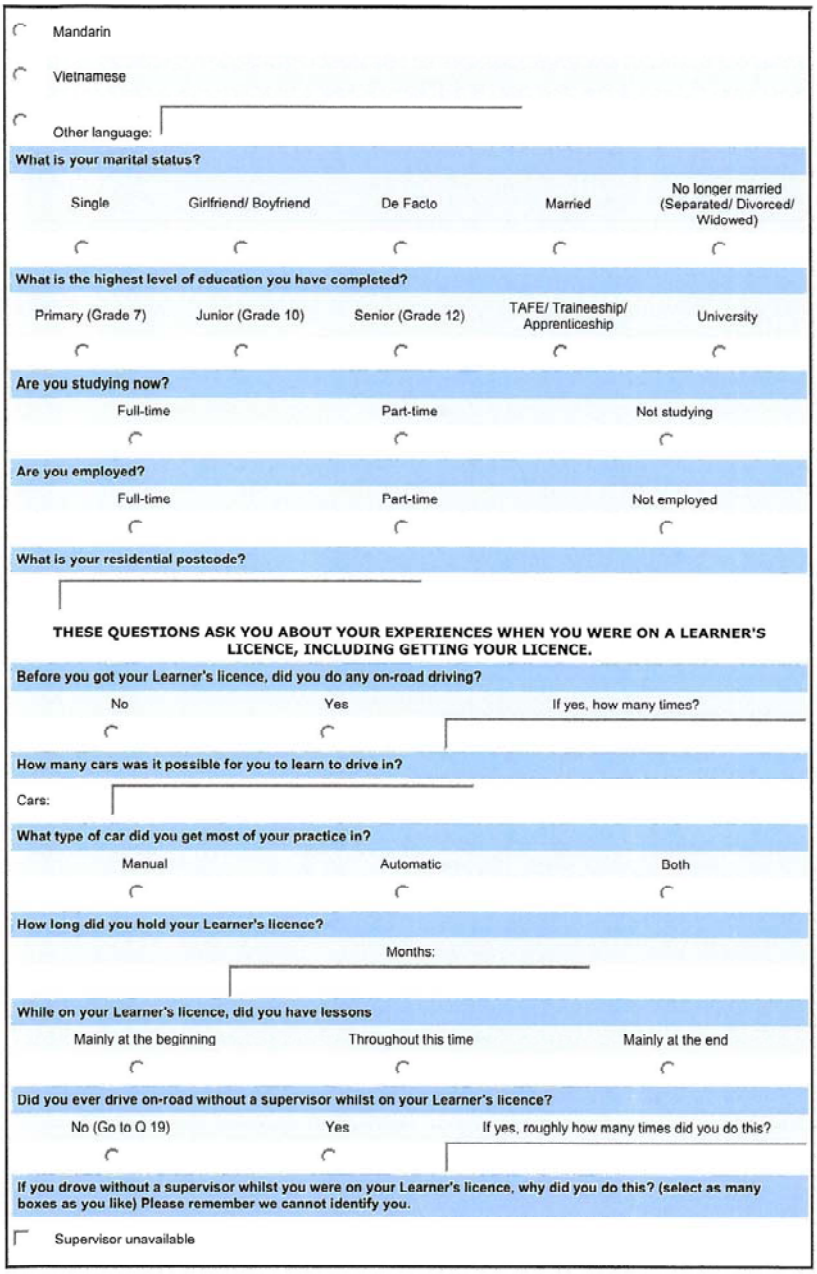
Yes ○ No ○ If yes, do you identify as Aboriginal or Torres Strait Islander?

Is English the main language spoken in your home?

Yes (Go to Q 7) ○ No ○

If English is not the main language spoken at home, what is?

○ Italian
○ Greek
○ Cantonese
○ Arabic



Mandarin

Vietnamese

Other language:

What is your marital status?

Single	Girlfriend/ Boyfriend	De Facto	Married	No longer married (Separated/ Divorced/ Widowed)
○	○	○	○	○

What is the highest level of education you have completed?

Primary (Grade 7)	Junior (Grade 10)	Senior (Grade 12)	TAFE/ Traineeship/ Apprenticeship	University
○	○	○	○	○

Are you studying now?

Full-time	Part-time	Not studying
○	○	○

Are you employed?

Full-time	Part-time	Not employed
○	○	○

What is your residential postcode?

THESE QUESTIONS ASK YOU ABOUT YOUR EXPERIENCES WHEN YOU WERE ON A LEARNER'S LICENCE, INCLUDING GETTING YOUR LICENCE.

Before you got your Learner's licence, did you do any on-road driving?

No	Yes	If yes, how many times?
○	○	

How many cars was it possible for you to learn to drive in?

Cars:

What type of car did you get most of your practice in?

Manual	Automatic	Both
○	○	○

How long did you hold your Learner's licence?

Months:

While on your Learner's licence, did you have lessons

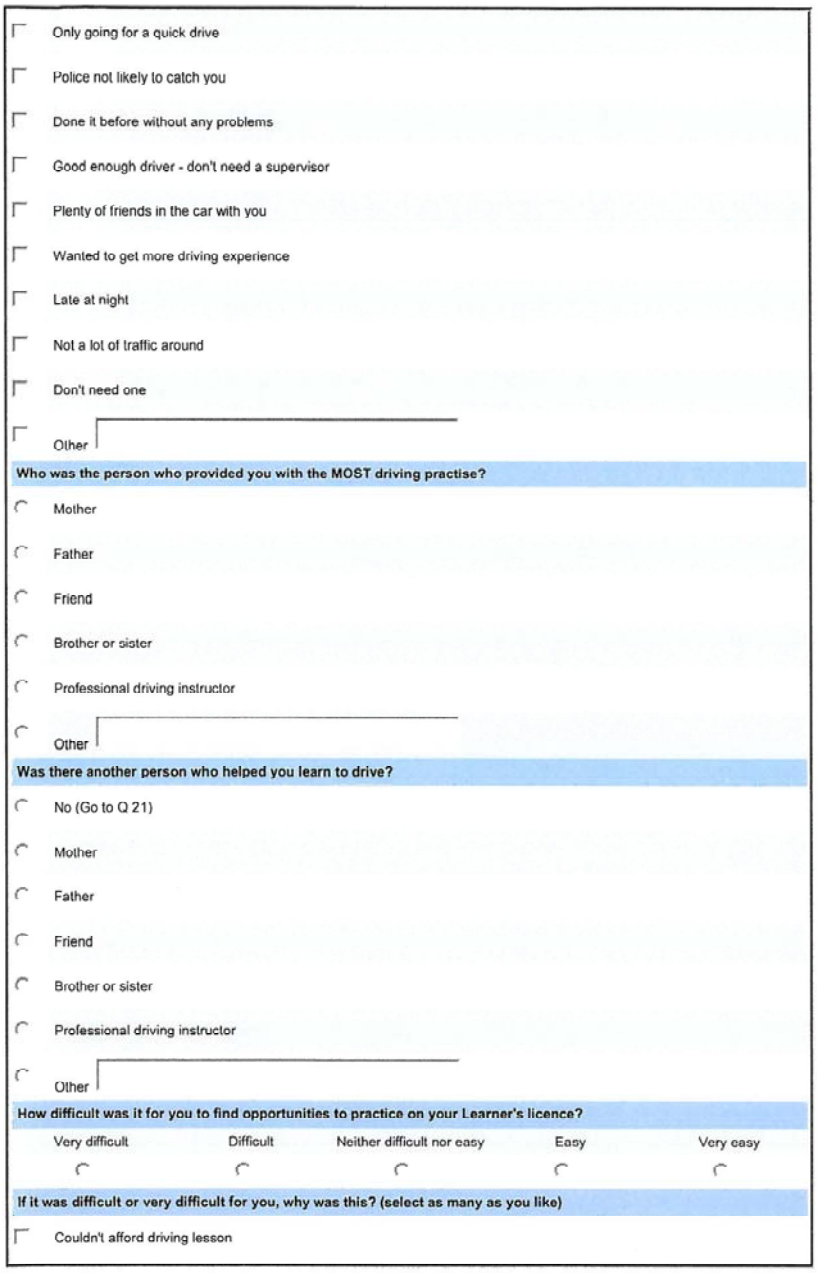
Mainly at the beginning	Throughout this time	Mainly at the end
○	○	○

Did you ever drive on-road without a supervisor whilst on your Learner's licence?

No (Go to Q 19)	Yes	If yes, roughly how many times did you do this?
○	○	

If you drove without a supervisor whilst you were on your Learner's licence, why did you do this? (select as many boxes as you like) Please remember we cannot identify you.

☐ Supervisor unavailable



- [ ] Only going for a quick drive
- [ ] Police not likely to catch you
- [ ] Done it before without any problems
- [ ] Good enough driver - don't need a supervisor
- [ ] Plenty of friends in the car with you
- [ ] Wanted to get more driving experience
- [ ] Late at night
- [ ] Not a lot of traffic around
- [ ] Don't need one
- [ ] Other

Who was the person who provided you with the MOST driving practise?

- ○ Mother
- ○ Father
- ○ Friend
- ○ Brother or sister
- ○ Professional driving instructor
- ○ Other

Was there another person who helped you learn to drive?

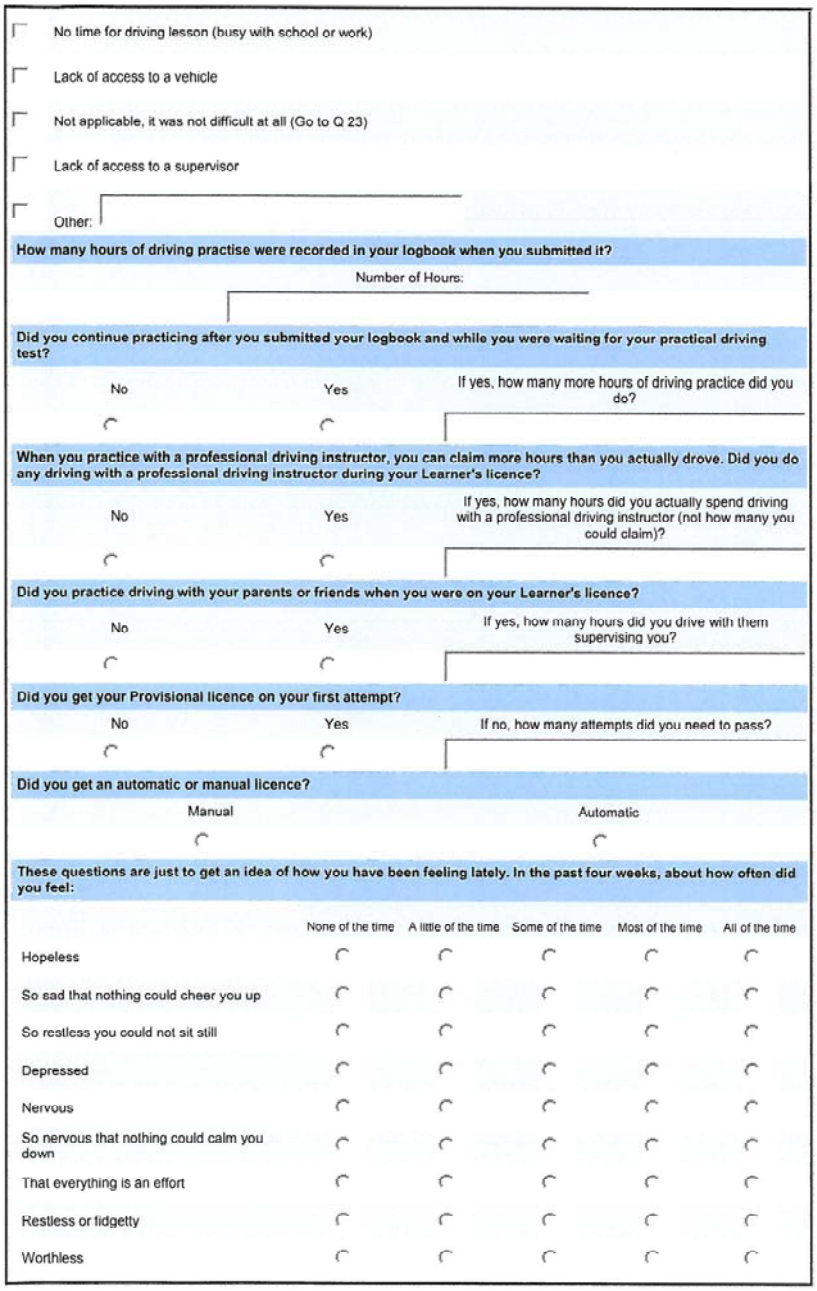
- ○ No (Go to Q 21)
- ○ Mother
- ○ Father
- ○ Friend
- ○ Brother or sister
- ○ Professional driving instructor
- ○ Other

How difficult was it for you to find opportunities to practice on your Learner's licence?

Very difficult	Difficult	Neither difficult nor easy	Easy	Very easy
○	○	○	○	○

If it was difficult or very difficult for you, why was this? (select as many as you like)

- [ ] Couldn't afford driving lesson



- [ ] No time for driving lesson (busy with school or work)
- [ ] Lack of access to a vehicle
- [ ] Not applicable, it was not difficult at all (Go to Q 23)
- [ ] Lack of access to a supervisor
- [ ] Other:

How many hours of driving practise were recorded in your logbook when you submitted it?

Number of Hours:

Did you continue practicing after you submitted your logbook and while you were waiting for your practical driving test?

No	Yes	If yes, how many more hours of driving practice did you do?
○	○	

When you practice with a professional driving instructor, you can claim more hours than you actually drove. Did you do any driving with a professional driving instructor during your Learner's licence?

No	Yes	If yes, how many hours did you actually spend driving with a professional driving instructor (not how many you could claim)?
○	○	

Did you practice driving with your parents or friends when you were on your Learner's licence?

No	Yes	If yes, how many hours did you drive with them supervising you?
○	○	

Did you get your Provisional licence on your first attempt?

No	Yes	If no, how many attempts did you need to pass?
○	○	

Did you get an automatic or manual licence?

Manual	Automatic
○	○

These questions are just to get an idea of how you have been feeling lately. In the past four weeks, about how often did you feel:

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Hopeless	○	○	○	○	○
So sad that nothing could cheer you up	○	○	○	○	○
So restless you could not sit still	○	○	○	○	○
Depressed	○	○	○	○	○
Nervous	○	○	○	○	○
So nervous that nothing could calm you down	○	○	○	○	○
That everything is an effort	○	○	○	○	○
Restless or fidgetty	○	○	○	○	○
Worthless	○	○	○	○	○

Tired out for no good reason	○	○	○	○	○

When you were on your Learner's licence, how often did you do the following things?

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You misjudged the stopping distance you needed	○	○	○	○	○
You overtook a car on the left	○	○	○	○	○
Your passengers didn't wear seatbelts	○	○	○	○	○
You deliberately sped when overtaking	○	○	○	○	○
You drove over the speed limit in areas where it was unlikely there was a radar or speed camera	○	○	○	○	○
You sped up when the lights went yellow	○	○	○	○	○
You went too fast around a corner	○	○	○	○	○
You spoke on a mobile that you held in your hands	○	○	○	○	○
You travelled in the right lane on multilane highways	○	○	○	○	○
You drove after taking an illicit drug such as marijuana or ecstasy	○	○	○	○	○
You sped at night on roads that were not well lit	○	○	○	○	○
You went 10-20 km/hr over the speed limit (eg 72 in a 60, 112 in a 100)	○	○	○	○	○
You went more than 20 km/hr over the speed limit (eg 60 in a 40, 100 in an 80)	○	○	○	○	○
You raced out of an intersection when the light went green	○	○	○	○	○
You went up to 10 km/hr over the speed limit (eg 65 in a 60, 105 in a 100)	○	○	○	○	○
You did an illegal U-turn	○	○	○	○	○

When you were on your Learner's licence, how often did you do the following things?

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You went for a drive with your mates giving you directions to where they wanted to go	○	○	○	○	○
You misjudged the gap when overtaking another vehicle	○	○	○	○	○
You missed your exit or turn	○	○	○	○	○
You entered the road in front of another vehicle	○	○	○	○	○
You carried more passengers than could legally fit in your car	○	○	○	○	○
You misjudged the speed exiting a main road	○	○	○	○	○
You misjudged the gap when you were	○	○	○	○	○

turning right					
You drove without a valid licence because you hadn't applied for one yet or it had been suspended	○	○	○	○	○
You drove a high-powered vehicle	○	○	○	○	○
Your car was full of your friends as passengers	○	○	○	○	○
You didn't wear a seatbelt if it was only for a short trip	○	○	○	○	○
You turned right into the path of another vehicle	○	○	○	○	○
You didn't always wear your seatbelt	○	○	○	○	○
You drove when you thought you may have been over the legal alcohol limit	○	○	○	○	○
You misjudged the speed of an oncoming vehicle	○	○	○	○	○
If there was no red light camera, you drove through intersections on a red light	○	○	○	○	○
You carried more passengers than there were seatbelts in your car	○	○	○	○	○

When you were on your Learner's licence. how often did you do the following things?

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You yelled or used rude gestures at another driver who had cut you off	○	○	○	○	○
You raced with other drivers	○	○	○	○	○
You followed someone who had cut you off	○	○	○	○	○
You drove in the rain	○	○	○	○	○
You didn't always indicate when you were changing lanes	○	○	○	○	○
Your driving was affected by emotions like anger or frustration	○	○	○	○	○
You allowed your driving style to be influenced by your mood	○	○	○	○	○
You took chances for the fun of it when driving in traffic	○	○	○	○	○
You drove when you knew you were tired	○	○	○	○	○
You drove without a qualified supervisor	○	○	○	○	○
You drove at peak times in the morning and in the afternoon	○	○	○	○	○
You drove on the weekend	○	○	○	○	○
You drove at night	○	○	○	○	○
You carried your friends as passengers at night	○	○	○	○	○
You drove at dusk or dawn	○	○	○	○	○

You drove faster if you were in a bad mood	○	○	○	○	○

These questions ask you about your feelings in general. There are no right or wrong answers.

	No	Yes
When you are with a group do you have difficulties selecting a good topic to talk about?	○	○
Do you generally give preference to those activities that give an immediate gain?	○	○
Does the good prospect of obtaining money motivate you strongly to do some things?	○	○
Are you easily discouraged in difficult situations?	○	○
Does the possibility of social advancement move you to action, even if this involves not playing fair?	○	○
Do you often have trouble resisting the temptation of doing forbidden things?	○	○
Would you like to be a socially powerful person?	○	○
Do you refrain from doing something because of your fear of being embarrassed?	○	○
Whenever possible do you avoid demonstrating your skills for fear of being embarrassed?	○	○
Are you a shy person?	○	○
Do you often refrain from doing something you like in order to not be rejected or disapproved of by others?	○	○
Do you prefer not to ask for something when you are not sure you will obtain it?	○	○
Do you often take the opportunity to pick up people you find attractive?	○	○
Do you, on a regular basis, think that you would do more things if it was not for your insecurity or fear?	○	○
Are you often afraid of new or unexpected situations?	○	○
Do you like displaying your physical abilities even though this may involve danger?	○	○
Do you sometimes do things for quick gains?	○	○
Comparing yourself to people you know, are you afraid of many things?	○	○
Do you generally try to avoid speaking in public?	○	○
Are you interested in money to the point of being able to do risky jobs?	○	○
Do you often do things to be praised?	○	○

Do you like being the centre of attention at a party or a social meeting?	○	○
Are you often worried about things you said or did?	○	○

WE WOULD LIKE TO KNOW WHAT YOU THOUGHT ABOUT THE ROAD RULES WHEN YOU WERE ON YOUR LEARNER'S LICENCE.

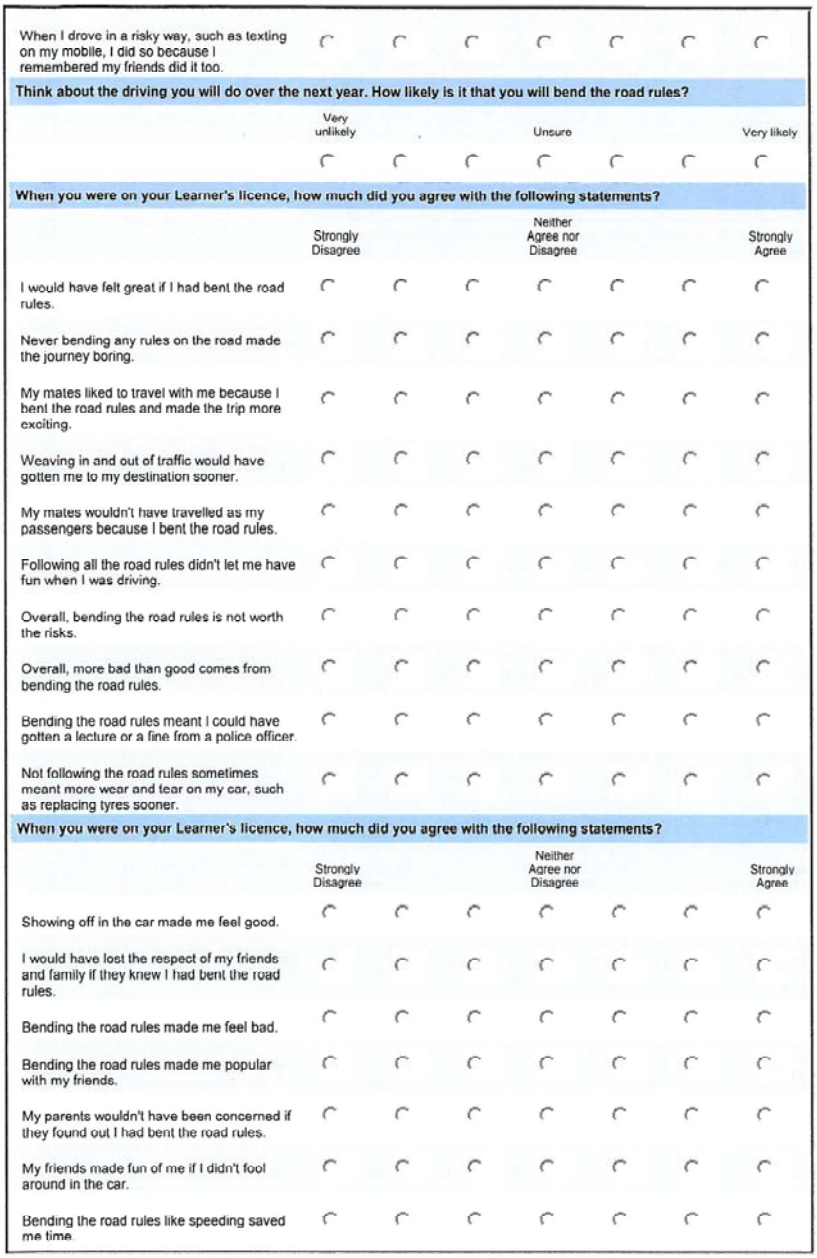
For all of these questions, 'road rules' also includes the graduated driver licensing restrictions you were on during your Learner period. When we ask about 'bending the road rules', this means any time you did not follow the road rules completely, and includes things like going over the speed limit by any amount or reading a text on your mobile while you are driving.

When you were on your Learner's licence, how much would you have agreed with the following statements?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
It's sometimes okay to bend the road rules.	○	○	○	○	○	○	○
Everybody has fun on the road, who cares about the road rules?	○	○	○	○	○	○	○
More bad than good comes from ignoring the road rules.	○	○	○	○	○	○	○
Road rules are made to be bent.	○	○	○	○	○	○	○
Not following the road rules is not worth the risks involved.	○	○	○	○	○	○	○
It's easy to stay safe and follow the road rules.	○	○	○	○	○	○	○
Following the road rules is something drivers shouldn't have to think about, it should just happen.	○	○	○	○	○	○	○
It's okay to bend the road rules if no-one gets hurt.	○	○	○	○	○	○	○
Road rules are just a guide for drivers.	○	○	○	○	○	○	○
You can't follow the road rules all the time.	○	○	○	○	○	○	○
Road rules are for other drivers.	○	○	○	○	○	○	○
It's okay to bend the road rules when I want to.	○	○	○	○	○	○	○

What about your agreement with these statements? Remember we are asking about when you had a Learner's Licence.

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
Seeing my friends bend the road rules influenced me to bend some road rules.	○	○	○	○	○	○	○
When I drove in a risky way, such as following a little too close, I did so because I remembered my parents did it too.	○	○	○	○	○	○	○
Seeing other novice drivers bend the road rules influenced me to do the same.	○	○	○	○	○	○	○
When I bent the road rules, such as driving faster than the speed limit, I did so because I saw this done by other novice drivers.	○	○	○	○	○	○	○
Seeing my parents bend some road rules influenced me to bend some road rules.	○	○	○	○	○	○	○



When I drove in a risky way, such as texting on my mobile, I did so because I remembered my friends did it too.	○	○	○	○	○	○	○

Think about the driving you will do over the next year. How likely is it that you will bend the road rules?

	Very unlikely			Unsure			Very likely
	○	○	○	○	○	○	○

When you were on your Learner's licence, how much did you agree with the following statements?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
I would have felt great if I had bent the road rules.	○	○	○	○	○	○	○
Never bending any rules on the road made the journey boring.	○	○	○	○	○	○	○
My mates liked to travel with me because I bent the road rules and made the trip more exciting.	○	○	○	○	○	○	○
Weaving in and out of traffic would have gotten me to my destination sooner.	○	○	○	○	○	○	○
My mates wouldn't have travelled as my passengers because I bent the road rules.	○	○	○	○	○	○	○
Following all the road rules didn't let me have fun when I was driving.	○	○	○	○	○	○	○
Overall, bending the road rules is not worth the risks.	○	○	○	○	○	○	○
Overall, more bad than good comes from bending the road rules.	○	○	○	○	○	○	○
Bending the road rules meant I could have gotten a lecture or a fine from a police officer.	○	○	○	○	○	○	○
Not following the road rules sometimes meant more wear and tear on my car, such as replacing tyres sooner.	○	○	○	○	○	○	○

When you were on your Learner's licence, how much did you agree with the following statements?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
Showing off in the car made me feel good.	○	○	○	○	○	○	○
I would have lost the respect of my friends and family if they knew I had bent the road rules.	○	○	○	○	○	○	○
Bending the road rules made me feel bad.	○	○	○	○	○	○	○
Bending the road rules made me popular with my friends.	○	○	○	○	○	○	○
My parents wouldn't have been concerned if they found out I had bent the road rules.	○	○	○	○	○	○	○
My friends made fun of me if I didn't fool around in the car.	○	○	○	○	○	○	○
Bending the road rules like speeding saved me time.	○	○	○	○	○	○	○

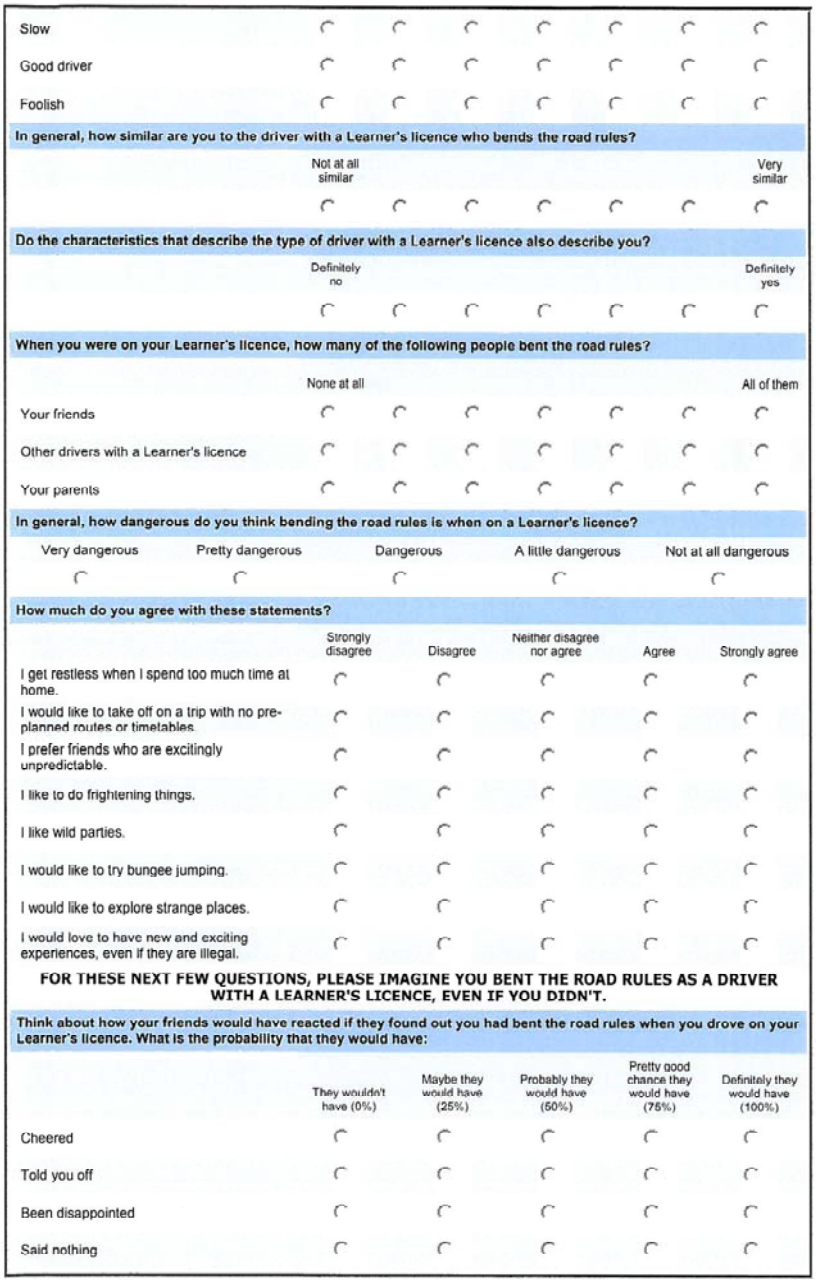
Bending the road rules meant I could go where I wanted when I wanted.	○	○	○	○	○	○	○
My friends would have thought I was really stupid if I bent the road rules.	○	○	○	○	○	○	○
Taking risks on the road like bending the rules gave me a thrill.	○	○	○	○	○	○	○

How much do you agree or disagree with these items?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
My parents think it is fine to bend the road rules.	○	○	○	○	○	○	○
The people who were influential in my early years of life don't worry about following all the road rules.	○	○	○	○	○	○	○
The people I consider most important to me don't mind bending the road rules now and then.	○	○	○	○	○	○	○
Other young drivers I know fool around while driving.	○	○	○	○	○	○	○
My friends aren't concerned about following the road rules; they just want to have fun.	○	○	○	○	○	○	○
The people I spend the most time with make sure they don't bend the road rules.	○	○	○	○	○	○	○
My friends don't follow all the road rules all the time.	○	○	○	○	○	○	○
My parents follow all the road rules all the time.	○	○	○	○	○	○	○
My friends think it is okay to bend the road rules.	○	○	○	○	○	○	○
The people I have known for a long time follow all the road rules.	○	○	○	○	○	○	○
The people I mix with a lot don't follow the road rules.	○	○	○	○	○	○	○

Think for a moment about the type of person your age who bends the road rules. We are not interested in anyone in particular, just the typical driver on a Learner's licence. What is your opinion of 'the type of person your age and gender and with your Learner driving experience' who bends the road rules?

	Not at all descriptive						Extremely descriptive
Immature	○	○	○	○	○	○	○
Safe	○	○	○	○	○	○	○
Cautious	○	○	○	○	○	○	○
Irresponsible	○	○	○	○	○	○	○
Show-off	○	○	○	○	○	○	○
Aware of dangers	○	○	○	○	○	○	○
Impatient	○	○	○	○	○	○	○
Sensible	○	○	○	○	○	○	○
Lead-foot	○	○	○	○	○	○	○



Slow	○	○	○	○	○	○	○
Good driver	○	○	○	○	○	○	○
Foolish	○	○	○	○	○	○	○

In general, how similar are you to the driver with a Learner's licence who bends the road rules?

Not at all similar						Very similar
○	○	○	○	○	○	○

Do the characteristics that describe the type of driver with a Learner's licence also describe you?

Definitely no						Definitely yes
○	○	○	○	○	○	○

When you were on your Learner's licence, how many of the following people bent the road rules?

	None at all						All of them
Your friends	○	○	○	○	○	○	○
Other drivers with a Learner's licence	○	○	○	○	○	○	○
Your parents	○	○	○	○	○	○	○

In general, how dangerous do you think bending the road rules is when on a Learner's licence?

Very dangerous	Pretty dangerous	Dangerous	A little dangerous	Not at all dangerous
○	○	○	○	○

How much do you agree with these statements?

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
I get restless when I spend too much time at home.	○	○	○	○	○
I would like to take off on a trip with no pre-planned routes or timetables.	○	○	○	○	○
I prefer friends who are excitingly unpredictable.	○	○	○	○	○
I like to do frightening things.	○	○	○	○	○
I like wild parties.	○	○	○	○	○
I would like to try bungee jumping.	○	○	○	○	○
I would like to explore strange places.	○	○	○	○	○
I would love to have new and exciting experiences, even if they are illegal.	○	○	○	○	○

FOR THESE NEXT FEW QUESTIONS, PLEASE IMAGINE YOU BENT THE ROAD RULES AS A DRIVER WITH A LEARNER'S LICENCE, EVEN IF YOU DIDN'T.

Think about how your friends would have reacted if they found out you had bent the road rules when you drove on your Learner's licence. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Cheered	○	○	○	○	○
Told you off	○	○	○	○	○
Been disappointed	○	○	○	○	○
Said nothing	○	○	○	○	○

Been unconcerned	○	○	○	○	○
Egged you on	○	○	○	○	○
Called you stupid	○	○	○	○	○

Now think about how your friends would have reacted if they found out you had bent the road rules when you drove on your Learner's licence, and something bad happened, like you had a car crash. What is the probability that they would have:

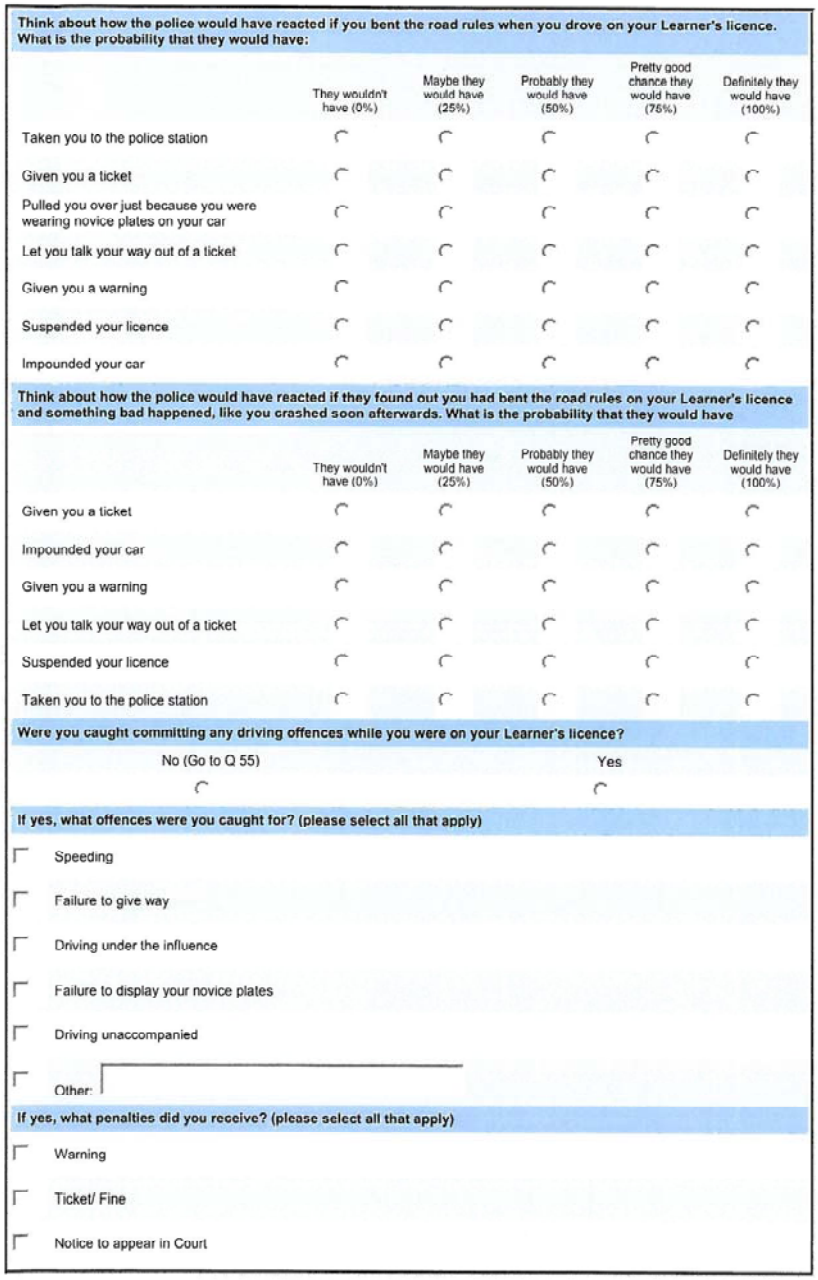
	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Cheered	○	○	○	○	○
Told you off	○	○	○	○	○
Been disappointed	○	○	○	○	○
Said nothing	○	○	○	○	○
Been unconcerned	○	○	○	○	○
Egged you on	○	○	○	○	○
Called you stupid	○	○	○	○	○

Think about how your parents would have reacted if they found out you had bent the road rules when you drove on your Learner's licence. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Been angry with you	○	○	○	○	○
Punished you in some way such as taking your mobile phone off you	○	○	○	○	○
Taken the keys off you	○	○	○	○	○
Said nothing	○	○	○	○	○
Told you it was up to you to drive the way you want to	○	○	○	○	○
Embarrassed you by telling other people you know what you had done	○	○	○	○	○
Told you off with a massive speech	○	○	○	○	○

Think about how your parents would have reacted if something bad happened after you had bent the road rules on your Learner's licence, like you had a car crash. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Been angry with you	○	○	○	○	○
Punished you in some way such as taking your mobile phone off you	○	○	○	○	○
Taken the keys off you	○	○	○	○	○
Said nothing	○	○	○	○	○
Told you it was up to you to drive the way you want to	○	○	○	○	○
Embarrassed you by telling other people you know what you had done	○	○	○	○	○
Told you off with a massive speech	○	○	○	○	○



Think about how the police would have reacted if you bent the road rules when you drove on your Learner's licence. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Taken you to the police station	○	○	○	○	○
Given you a ticket	○	○	○	○	○
Pulled you over just because you were wearing novice plates on your car	○	○	○	○	○
Let you talk your way out of a ticket	○	○	○	○	○
Given you a warning	○	○	○	○	○
Suspended your licence	○	○	○	○	○
Impounded your car	○	○	○	○	○

Think about how the police would have reacted if they found out you had bent the road rules on your Learner's licence and something bad happened, like you crashed soon afterwards. What is the probability that they would have

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Given you a ticket	○	○	○	○	○
Impounded your car	○	○	○	○	○
Given you a warning	○	○	○	○	○
Let you talk your way out of a ticket	○	○	○	○	○
Suspended your licence	○	○	○	○	○
Taken you to the police station	○	○	○	○	○

Were you caught committing any driving offences while you were on your Learner's licence?

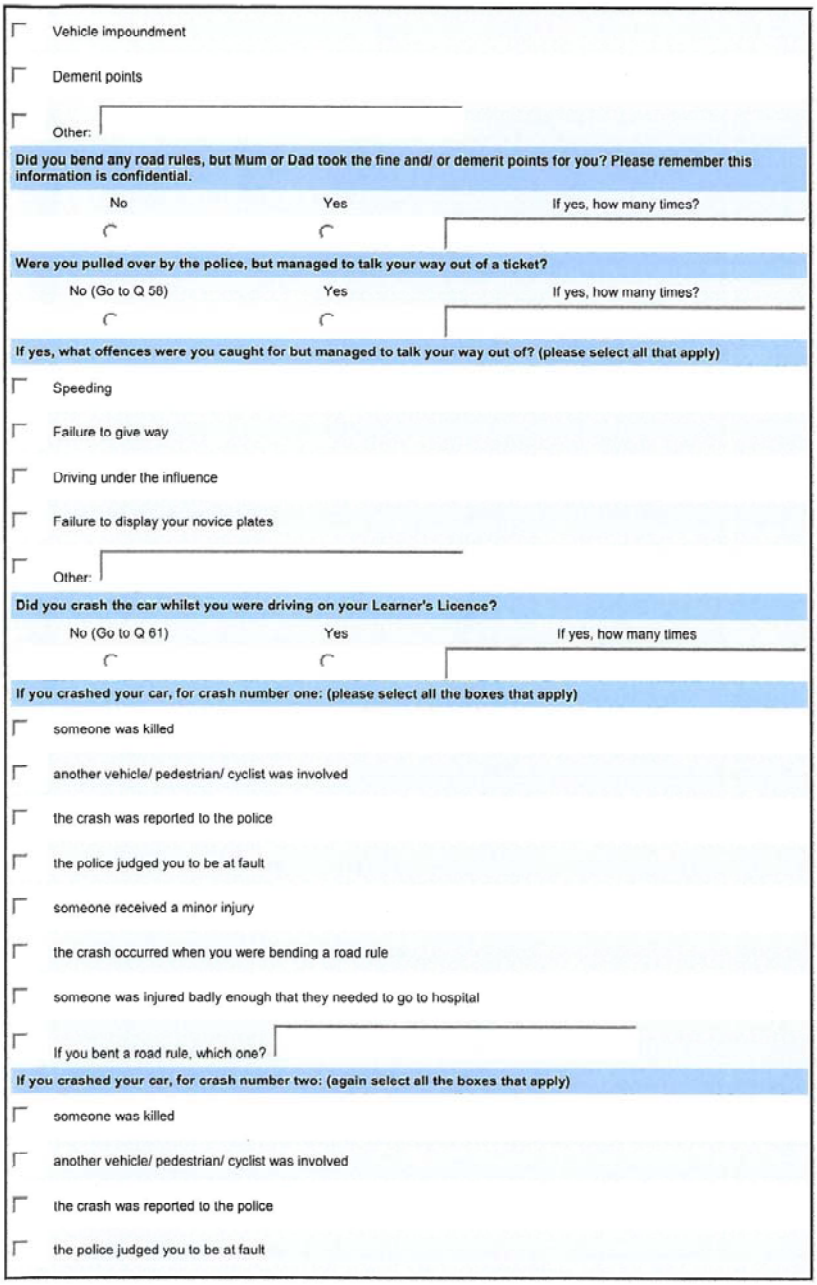
No (Go to Q 55)	Yes
○	○

If yes, what offences were you caught for? (please select all that apply)

- ☐ Speeding
- ☐ Failure to give way
- ☐ Driving under the influence
- ☐ Failure to display your novice plates
- ☐ Driving unaccompanied
- ☐ Other:

If yes, what penalties did you receive? (please select all that apply)

- ☐ Warning
- ☐ Ticket/ Fine
- ☐ Notice to appear in Court



- [ ] Vehicle impoundment
- [ ] Demerit points
- [ ] Other:

Did you bend any road rules, but Mum or Dad took the fine and/ or demerit points for you? Please remember this information is confidential.

No	Yes	If yes, how many times?
○	○	

Were you pulled over by the police, but managed to talk your way out of a ticket?

No (Go to Q 58)	Yes	If yes, how many times?
○	○	

If yes, what offences were you caught for but managed to talk your way out of? (please select all that apply)

- [ ] Speeding
- [ ] Failure to give way
- [ ] Driving under the influence
- [ ] Failure to display your novice plates
- [ ] Other:

Did you crash the car whilst you were driving on your Learner's Licence?

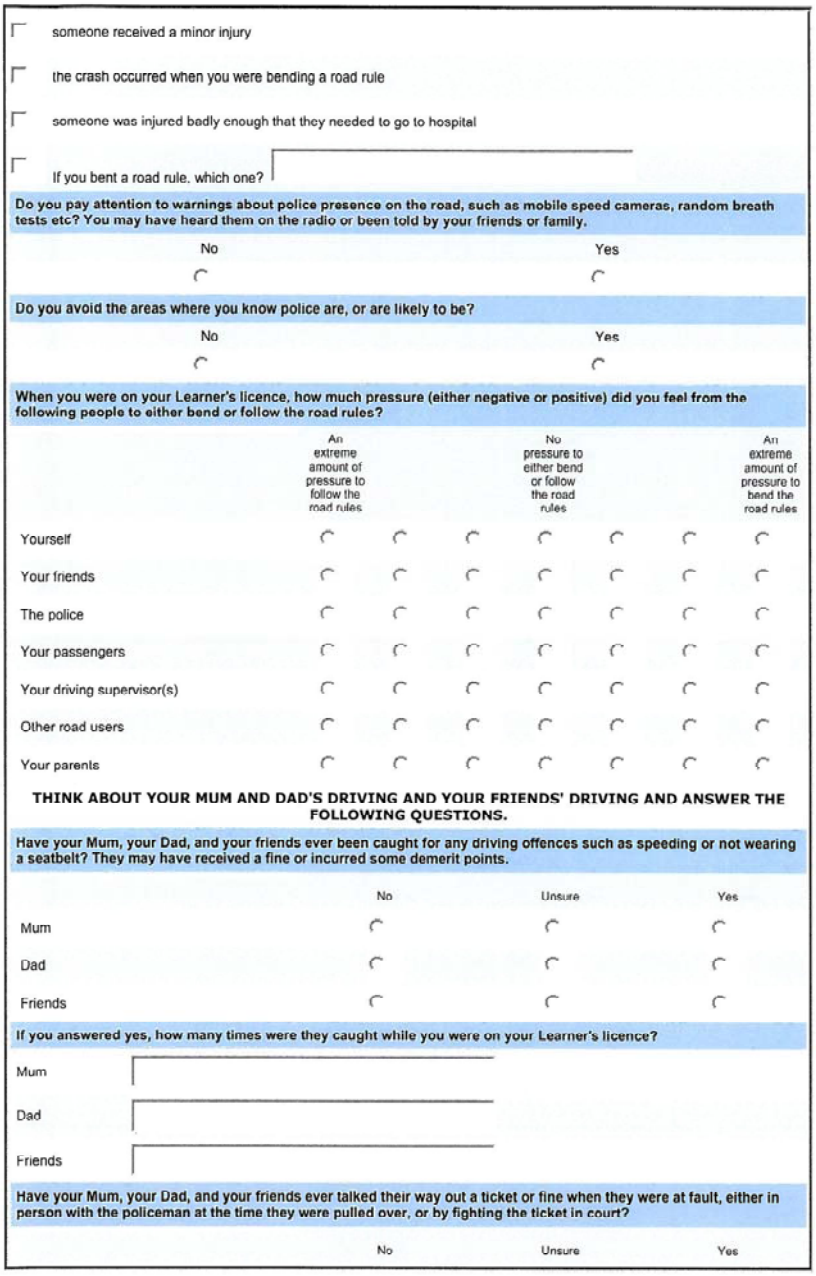
No (Go to Q 61)	Yes	If yes, how many times
○	○	

If you crashed your car, for crash number one: (please select all the boxes that apply)

- [ ] someone was killed
- [ ] another vehicle/ pedestrian/ cyclist was involved
- [ ] the crash was reported to the police
- [ ] the police judged you to be at fault
- [ ] someone received a minor injury
- [ ] the crash occurred when you were bending a road rule
- [ ] someone was injured badly enough that they needed to go to hospital
- [ ] If you bent a road rule, which one?

If you crashed your car, for crash number two: (again select all the boxes that apply)

- [ ] someone was killed
- [ ] another vehicle/ pedestrian/ cyclist was involved
- [ ] the crash was reported to the police
- [ ] the police judged you to be at fault



- [ ] someone received a minor injury
- [ ] the crash occurred when you were bending a road rule
- [ ] someone was injured badly enough that they needed to go to hospital
- [ ] If you bent a road rule, which one? _____

Do you pay attention to warnings about police presence on the road, such as mobile speed cameras, random breath tests etc? You may have heard them on the radio or been told by your friends or family.

No	Yes
○	○

Do you avoid the areas where you know police are, or are likely to be?

No	Yes
○	○

When you were on your Learner's licence, how much pressure (either negative or positive) did you feel from the following people to either bend or follow the road rules?

	An extreme amount of pressure to follow the road rules			No pressure to either bend or follow the road rules			An extreme amount of pressure to bend the road rules
Yourself	○	○	○	○	○	○	○
Your friends	○	○	○	○	○	○	○
The police	○	○	○	○	○	○	○
Your passengers	○	○	○	○	○	○	○
Your driving supervisor(s)	○	○	○	○	○	○	○
Other road users	○	○	○	○	○	○	○
Your parents	○	○	○	○	○	○	○

THINK ABOUT YOUR MUM AND DAD'S DRIVING AND YOUR FRIENDS' DRIVING AND ANSWER THE FOLLOWING QUESTIONS.

Have your Mum, your Dad, and your friends ever been caught for any driving offences such as speeding or not wearing a seatbelt? They may have received a fine or incurred some demerit points.

	No	Unsure	Yes
Mum	○	○	○
Dad	○	○	○
Friends	○	○	○

If you answered yes, how many times were they caught while you were on your Learner's licence?

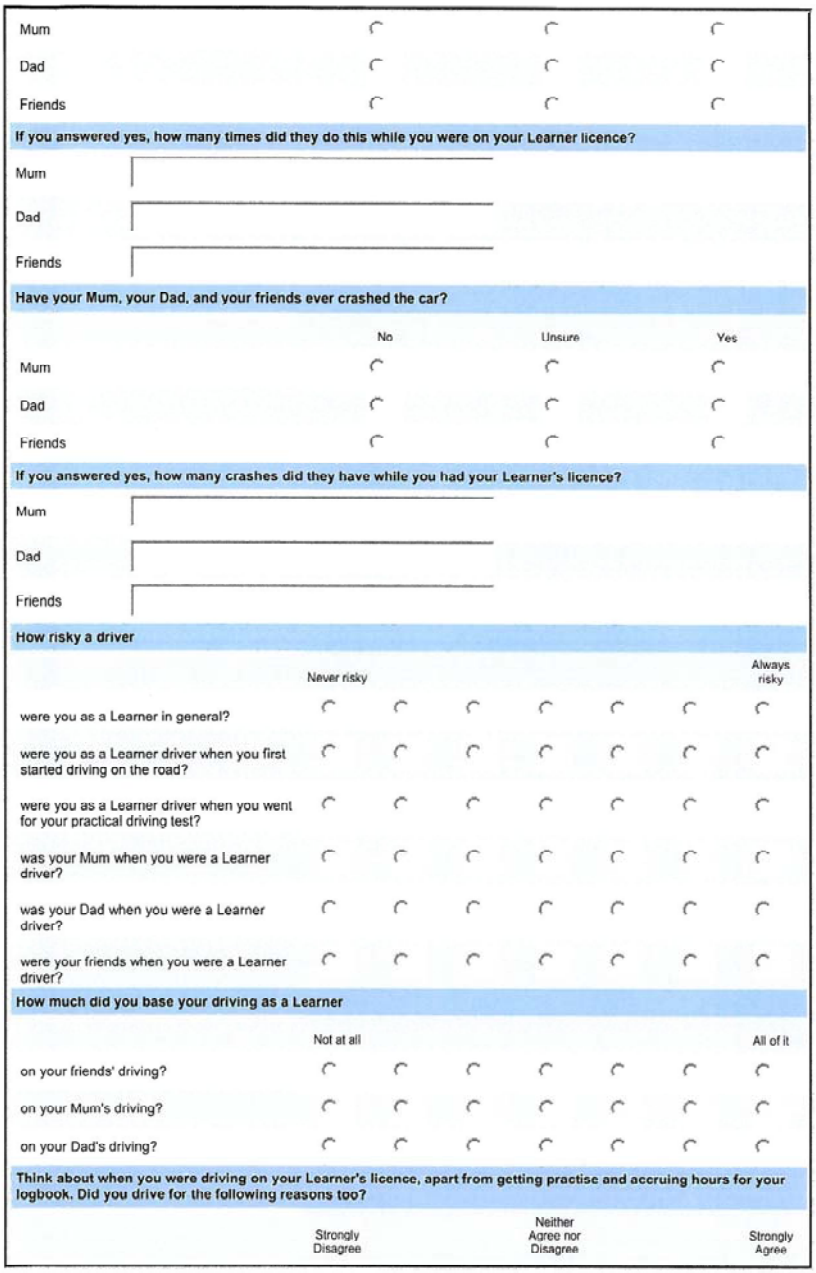
Mum _____

Dad _____

Friends _____

Have your Mum, your Dad, and your friends ever talked their way out a ticket or fine when they were at fault, either in person with the policeman at the time they were pulled over, or by fighting the ticket in court?

	No	Unsure	Yes



Mum	○	○	○
Dad	○	○	○
Friends	○	○	○

If you answered yes, how many times did they do this while you were on your Learner licence?

Mum	
Dad	
Friends	

Have your Mum, your Dad, and your friends ever crashed the car?

	No	Unsure	Yes
Mum	○	○	○
Dad	○	○	○
Friends	○	○	○

If you answered yes, how many crashes did they have while you had your Learner's licence?

Mum	
Dad	
Friends	

How risky a driver

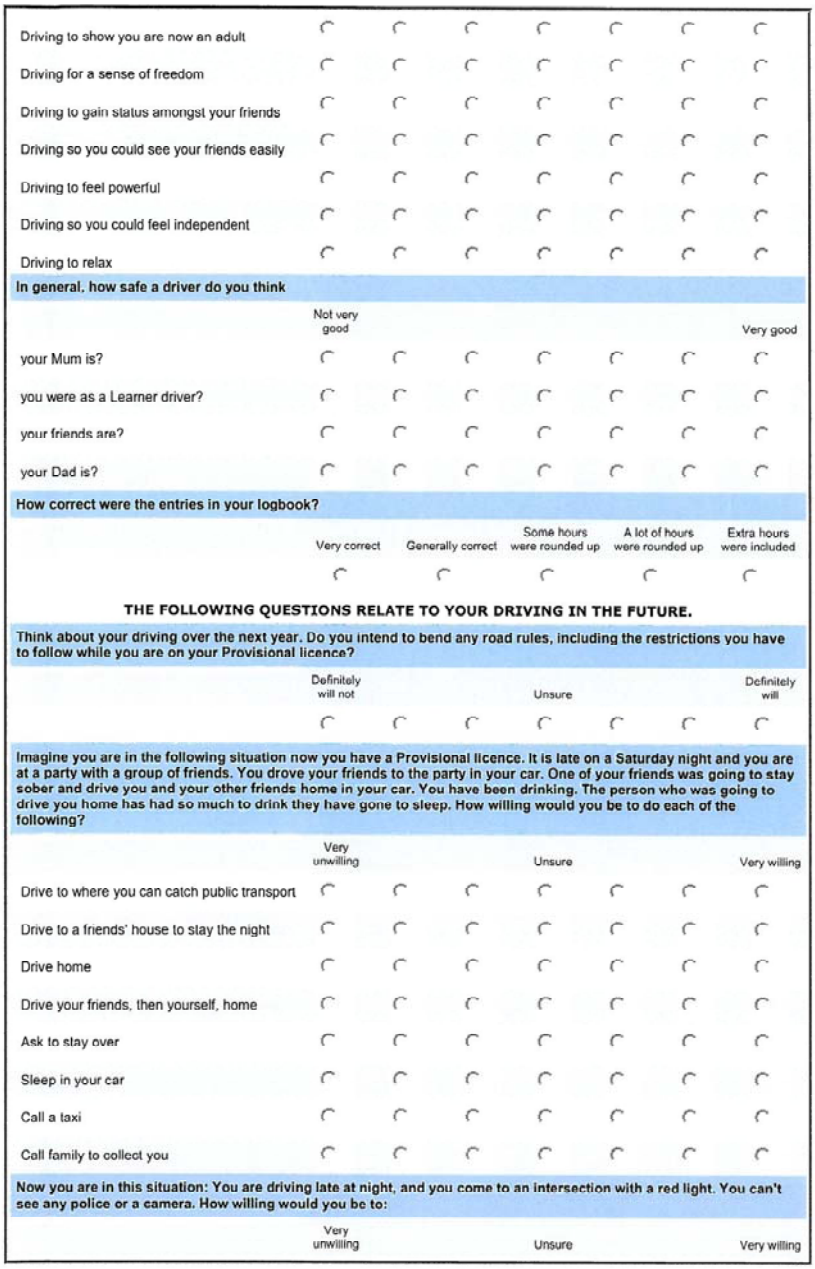
	Never risky						Always risky
were you as a Learner in general?	○	○	○	○	○	○	○
were you as a Learner driver when you first started driving on the road?	○	○	○	○	○	○	○
were you as a Learner driver when you went for your practical driving test?	○	○	○	○	○	○	○
was your Mum when you were a Learner driver?	○	○	○	○	○	○	○
was your Dad when you were a Learner driver?	○	○	○	○	○	○	○
were your friends when you were a Learner driver?	○	○	○	○	○	○	○

How much did you base your driving as a Learner

	Not at all						All of it
on your friends' driving?	○	○	○	○	○	○	○
on your Mum's driving?	○	○	○	○	○	○	○
on your Dad's driving?	○	○	○	○	○	○	○

Think about when you were driving on your Learner's licence, apart from getting practise and accruing hours for your logbook. Did you drive for the following reasons too?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree



Driving to show you are now an adult	○	○	○	○	○	○	○
Driving for a sense of freedom	○	○	○	○	○	○	○
Driving to gain status amongst your friends	○	○	○	○	○	○	○
Driving so you could see your friends easily	○	○	○	○	○	○	○
Driving to feel powerful	○	○	○	○	○	○	○
Driving so you could feel independent	○	○	○	○	○	○	○
Driving to relax	○	○	○	○	○	○	○

In general, how safe a driver do you think

	Not very good						Very good
your Mum is?	○	○	○	○	○	○	○
you were as a Learner driver?	○	○	○	○	○	○	○
your friends are?	○	○	○	○	○	○	○
your Dad is?	○	○	○	○	○	○	○

How correct were the entries in your logbook?

Very correct	Generally correct	Some hours were rounded up	A lot of hours were rounded up	Extra hours were included
○	○	○	○	○

THE FOLLOWING QUESTIONS RELATE TO YOUR DRIVING IN THE FUTURE.

Think about your driving over the next year. Do you intend to bend any road rules, including the restrictions you have to follow while you are on your Provisional licence?

	Definitely will not			Unsure			Definitely will
	○	○	○	○	○	○	○

Imagine you are in the following situation now you have a Provisional licence. It is late on a Saturday night and you are at a party with a group of friends. You drove your friends to the party in your car. One of your friends was going to stay sober and drive you and your other friends home in your car. You have been drinking. The person who was going to drive you home has had so much to drink they have gone to sleep. How willing would you be to do each of the following?

	Very unwilling			Unsure			Very willing
Drive to where you can catch public transport	○	○	○	○	○	○	○
Drive to a friends' house to stay the night	○	○	○	○	○	○	○
Drive home	○	○	○	○	○	○	○
Drive your friends, then yourself, home	○	○	○	○	○	○	○
Ask to stay over	○	○	○	○	○	○	○
Sleep in your car	○	○	○	○	○	○	○
Call a taxi	○	○	○	○	○	○	○
Call family to collect you	○	○	○	○	○	○	○

Now you are in this situation: You are driving late at night, and you come to an intersection with a red light. You can't see any police or a camera. How willing would you be to:

	Very unwilling			Unsure			Very willing

Stop at the red light	○	○	○	○	○	○	○
Slow down for the red light but keep driving slowly	○	○	○	○	○	○	○
Drive through the red light	○	○	○	○	○	○	○
Speed up when you get to the red light	○	○	○	○	○	○	○

You are driving at the speed limit with friends in the car. You can't see any police or cameras around. Your friends suggest you drive faster. What are you willing to do in this situation?

	Very unwilling			Unsure			Very willing
Stick to the speed limit	○	○	○	○	○	○	○
Go a little bit faster	○	○	○	○	○	○	○
Go a fair bit faster	○	○	○	○	○	○	○
Go a lot faster	○	○	○	○	○	○	○

You are at a party, and it is just after midnight. You are about to go home, and your friends ask you for a lift in your car. How willing would you be to:

	Very unwilling			Unsure			Very willing
Tell them to catch a bus or walk home	○	○	○	○	○	○	○
Give them a lift	○	○	○	○	○	○	○
Tell them to take a taxi	○	○	○	○	○	○	○
Tell then to get a lift with someone else	○	○	○	○	○	○	○
Tell them to stay over at the party	○	○	○	○	○	○	○
Tell them no	○	○	○	○	○	○	○

Now you have your Provisional licence, if you were to bend the road rules regularly (say TWICE A WEEK for a year), what do you think the chances are you would:

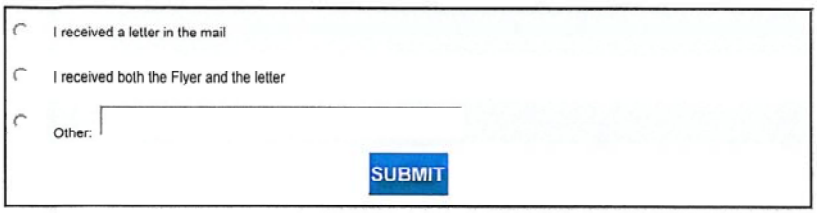
	No chance						Definitely would happen
Get a ticket	○	○	○	○	○	○	○
Hurt someone (including yourself)	○	○	○	○	○	○	○
Kill someone (including yourself)	○	○	○	○	○	○	○
Crash	○	○	○	○	○	○	○

If you were to bend the road rules ONCE or TWICE in the next year, what do you think the chances are you would:

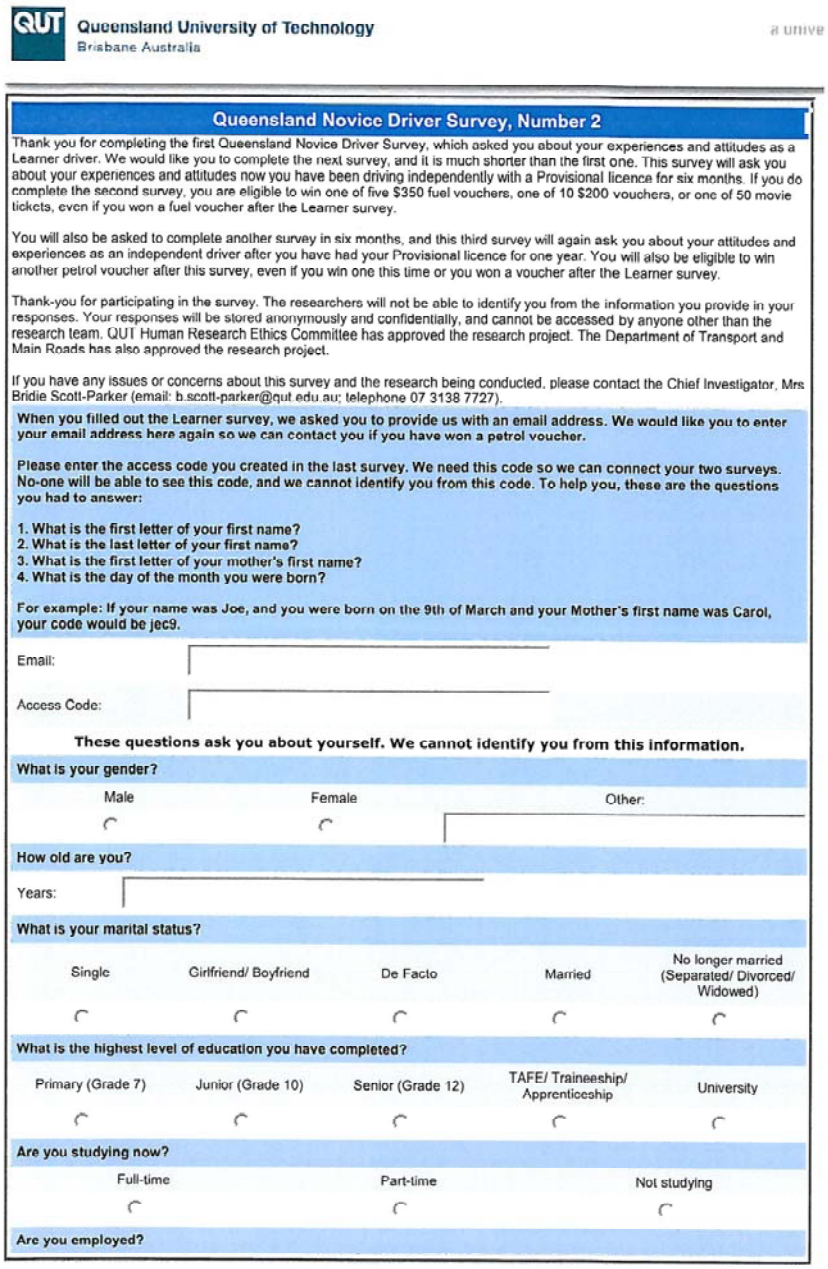
	No chance						Definitely would happen
Get a ticket	○	○	○	○	○	○	○
Hurt someone (including yourself)	○	○	○	○	○	○	○
Kill someone (including yourself)	○	○	○	○	○	○	○
Crash	○	○	○	○	○	○	○

Finally, we would like to know how you heard about the Survey. Please choose one of the following:

○ I received a Flyer when I was given my Provisional driver's licence


I received a letter in the mail
I received both the Flyer and the letter
Other:
SUBMIT

Appendix E: The survey of Stage Three: Provisional Driver Survey



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Queensland Novice Driver Survey, Number 2

Thank you for completing the first Queensland Novice Driver Survey, which asked you about your experiences and attitudes as a Learner driver. We would like you to complete the next survey, and it is much shorter than the first one. This survey will ask you about your experiences and attitudes now you have been driving independently with a Provisional licence for six months. If you do complete the second survey, you are eligible to win one of five $350 fuel vouchers, one of 10 $200 vouchers, or one of 50 movie tickets, even if you won a fuel voucher after the Learner survey.

You will also be asked to complete another survey in six months, and this third survey will again ask you about your attitudes and experiences as an independent driver after you have had your Provisional licence for one year. You will also be eligible to win another petrol voucher after this survey, even if you win one this time or you won a voucher after the Learner survey.

Thank-you for participating in the survey. The researchers will not be able to identify you from the information you provide in your responses. Your responses will be stored anonymously and confidentially, and cannot be accessed by anyone other than the research team. QUT Human Research Ethics Committee has approved the research project. The Department of Transport and Main Roads has also approved the research project.

If you have any issues or concerns about this survey and the research being conducted, please contact the Chief Investigator, Mrs Bridie Scott-Parker (email: b.scott-parker@qut.edu.au; telephone 07 3138 7727).

When you filled out the Learner survey, we asked you to provide us with an email address. We would like you to enter your email address here again so we can contact you if you have won a petrol voucher.

Please enter the access code you created in the last survey. We need this code so we can connect your two surveys. No-one will be able to see this code, and we cannot identify you from this code. To help you, these are the questions you had to answer:

1. What is the first letter of your first name?
2. What is the last letter of your first name?
3. What is the first letter of your mother's first name?
4. What is the day of the month you were born?

For example: If your name was Joe, and you were born on the 9th of March and your Mother's first name was Carol, your code would be jec9.

Email:

Access Code:

These questions ask you about yourself. We cannot identify you from this information.

What is your gender?

Male ○ Female ○ Other:

How old are you?

Years:

What is your marital status?

Single ○ Girlfriend/ Boyfriend ○ De Facto ○ Married ○ No longer married (Separated/ Divorced/ Widowed) ○

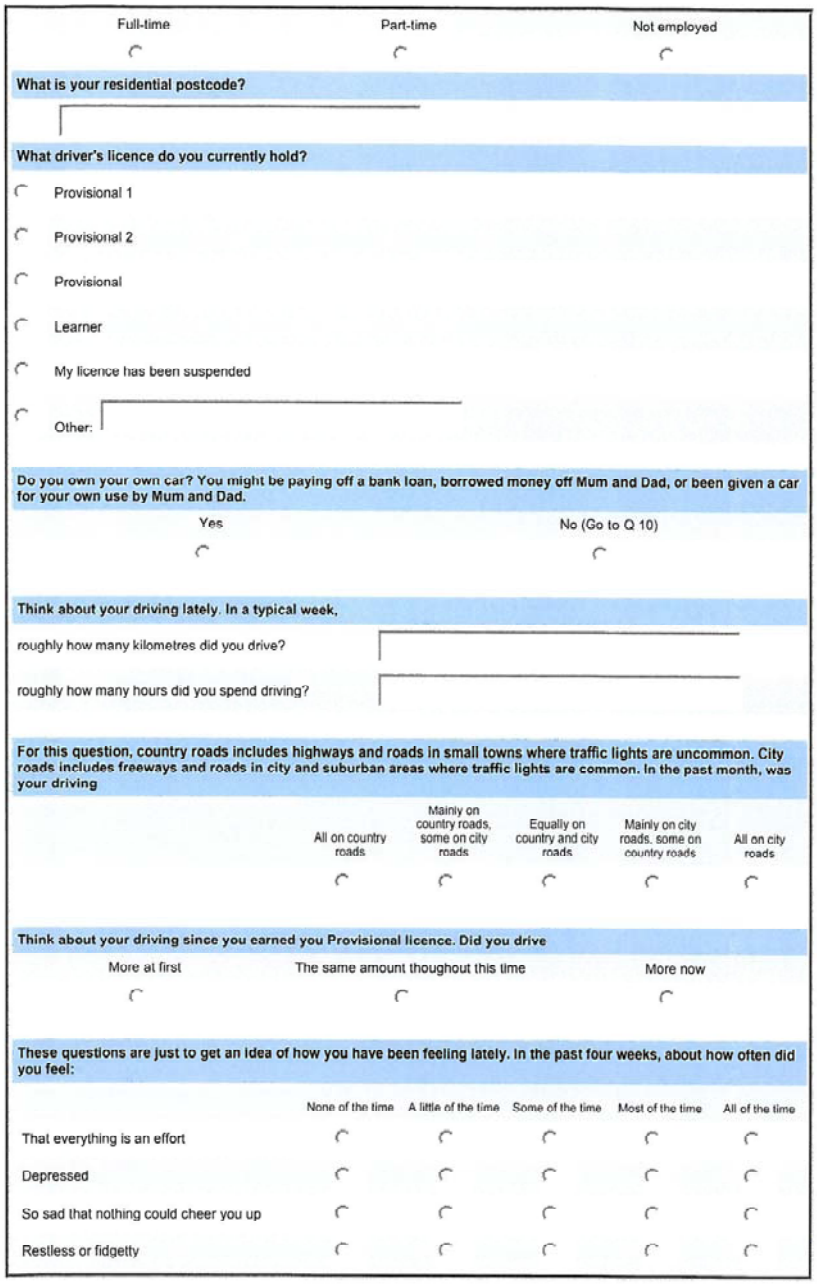
What is the highest level of education you have completed?

Primary (Grade 7) ○ Junior (Grade 10) ○ Senior (Grade 12) ○ TAFE/ Traineeship/ Apprenticeship ○ University ○

Are you studying now?

Full-time ○ Part-time ○ Not studying ○

Are you employed?



Full-time | Part-time | Not employed

What is your residential postcode?

What driver's licence do you currently hold?

- Provisional 1
- Provisional 2
- Provisional
- Learner
- My licence has been suspended
- Other:

Do you own your own car? You might be paying off a bank loan, borrowed money off Mum and Dad, or been given a car for your own use by Mum and Dad.

Yes | No (Go to Q 10)

Think about your driving lately. In a typical week,

roughly how many kilometres did you drive?

roughly how many hours did you spend driving?

For this question, country roads includes highways and roads in small towns where traffic lights are uncommon. City roads includes freeways and roads in city and suburban areas where traffic lights are common. In the past month, was your driving

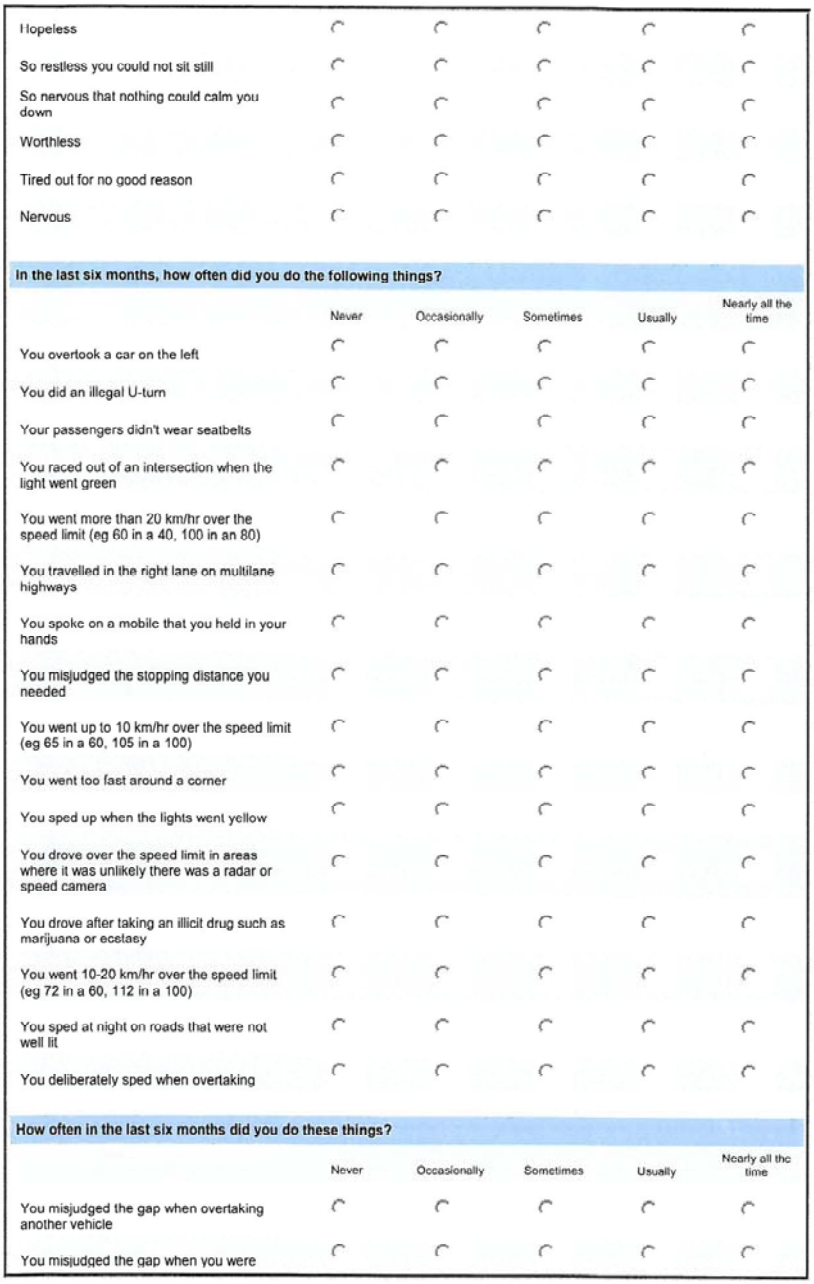
All on country roads	Mainly on country roads, some on city roads	Equally on country and city roads	Mainly on city roads, some on country roads	All on city roads

Think about your driving since you earned you Provisional licence. Did you drive

More at first | The same amount thoughout this time | More now

These questions are just to get an idea of how you have been feeling lately. In the past four weeks, about how often did you feel:

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
That everything is an effort					
Depressed					
So sad that nothing could cheer you up					
Restless or fidgetty					



Hopeless	○	○	○	○	○
So restless you could not sit still	○	○	○	○	○
So nervous that nothing could calm you down	○	○	○	○	○
Worthless	○	○	○	○	○
Tired out for no good reason	○	○	○	○	○
Nervous	○	○	○	○	○

In the last six months, how often did you do the following things?

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You overtook a car on the left	○	○	○	○	○
You did an illegal U-turn	○	○	○	○	○
Your passengers didn't wear seatbelts	○	○	○	○	○
You raced out of an intersection when the light went green	○	○	○	○	○
You went more than 20 km/hr over the speed limit (eg 60 in a 40, 100 in an 80)	○	○	○	○	○
You travelled in the right lane on multilane highways	○	○	○	○	○
You spoke on a mobile that you held in your hands	○	○	○	○	○
You misjudged the stopping distance you needed	○	○	○	○	○
You went up to 10 km/hr over the speed limit (eg 65 in a 60, 105 in a 100)	○	○	○	○	○
You went too fast around a corner	○	○	○	○	○
You sped up when the lights went yellow	○	○	○	○	○
You drove over the speed limit in areas where it was unlikely there was a radar or speed camera	○	○	○	○	○
You drove after taking an illicit drug such as marijuana or ecstasy	○	○	○	○	○
You went 10-20 km/hr over the speed limit (eg 72 in a 60, 112 in a 100)	○	○	○	○	○
You sped at night on roads that were not well lit	○	○	○	○	○
You deliberately sped when overtaking	○	○	○	○	○

How often in the last six months did you do these things?

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You misjudged the gap when overtaking another vehicle	○	○	○	○	○
You misjudged the gap when you were	○	○	○	○	○

turning right					
You entered the road in front of another vehicle	○	○	○	○	○
You drove when you thought you may have been over the legal alcohol limit	○	○	○	○	○
You carried more passengers than there were seatbelts in your car	○	○	○	○	○
You drove a high-powered vehicle	○	○	○	○	○
You carried more passengers than could legally fit in your car	○	○	○	○	○
You went for a drive with your mates giving you directions to where they wanted to go	○	○	○	○	○
If there was no red light camera, you drove through intersections on a red light	○	○	○	○	○
You misjudged the speed of an oncoming vehicle	○	○	○	○	○
You misjudged the speed exiting a main road	○	○	○	○	○
You didn't wear a seatbelt if it was only for a short trip	○	○	○	○	○
Your car was full of your friends as passengers	○	○	○	○	○
You didn't always wear your seatbelt	○	○	○	○	○
You drove without a valid licence because it had been suspended	○	○	○	○	○
You turned right into the path of another vehicle	○	○	○	○	○
You missed your exit or turn	○	○	○	○	○

In the last six months, how often did you do the following things?

	Never	Occasionally	Sometimes	Usually	Nearly all the time
You drove at night	○	○	○	○	○
You allowed your driving style to be influenced by your mood	○	○	○	○	○
You didn't always indicate when you were changing lanes	○	○	○	○	○
You drove faster if you were in a bad mood	○	○	○	○	○
You drove when you knew you were tired	○	○	○	○	○
Your driving was affected by emotions like anger or frustration	○	○	○	○	○
You took chances for the fun of it when driving in traffic	○	○	○	○	○
You drove in the rain	○	○	○	○	○
You carried two or more passengers after 11:00 pm	○	○	○	○	○

You drove at peak times in the morning and in the afternoon	○	○	○	○	○
You carried your friends as passengers at night	○	○	○	○	○
You drove on the weekend	○	○	○	○	○
You followed someone who had cut you off	○	○	○	○	○
You yelled or used rude gestures at another driver who had cut you off	○	○	○	○	○
You raced with other drivers	○	○	○	○	○
You drove at dusk or dawn	○	○	○	○	○

These questions ask you about your feelings in general. There are no right or wrong answers.

	No	Yes
Whenever possible do you avoid demonstrating your skills for fear of being embarrassed?	○	○
Would you like to be a socially powerful person?	○	○
Do you like displaying your physical abilities even though this may involve danger?	○	○
Do you often take the opportunity to pick up people you find attractive?	○	○
Are you often afraid of new or unexpected situations?	○	○
Do you often have trouble resisting the temptation of doing forbidden things?	○	○
Do you often refrain from doing something you like in order to not be rejected or disapproved of by others?	○	○
Do you, on a regular basis, think that you would do more things if it was not for your insecurity or fear?	○	○
Are you easily discouraged in difficult situations?	○	○
Do you prefer not to ask for something when you are not sure you will obtain it?	○	○
Do you generally give preference to those activities that give an immediate gain?	○	○
Are you often worried about things you said or did?	○	○
Does the possibility of social advancement move you to action, even if this involves not playing fair?	○	○
Do you generally try to avoid speaking in public?	○	○
When you are with a group do you have difficulties selecting a good topic to talk about?	○	○

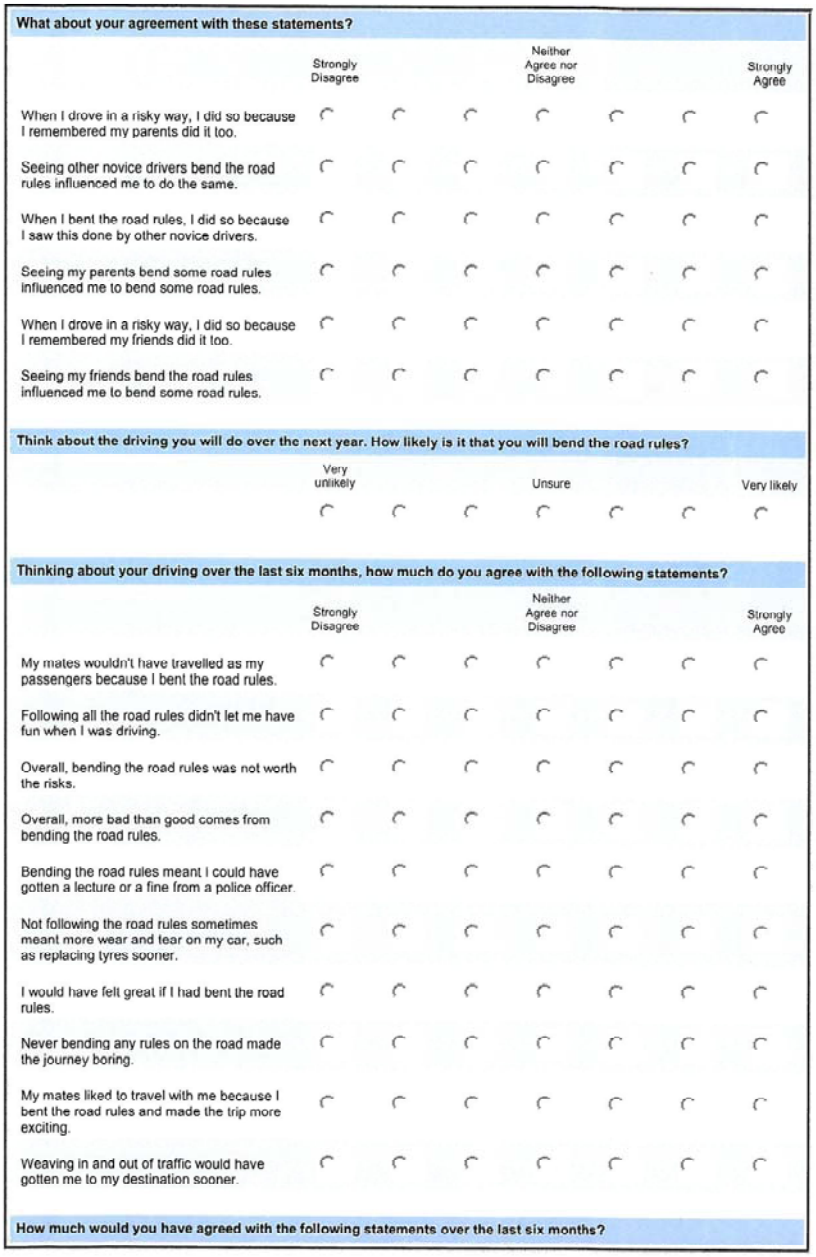
Do you often do things to be praised?	○	○
Do you sometimes do things for quick gains?	○	○
Comparing yourself to people you know, are you afraid of many things?	○	○
Are you a shy person?	○	○
Does the good prospect of obtaining money motivate you strongly to do some things?	○	○
Do you like being the centre of attention at a party or a social meeting?	○	○
Are you interested in money to the point of being able to do risky jobs?	○	○
Do you refrain from doing something because of your fear of being embarrassed?	○	○

WE WOULD LIKE TO KNOW WHAT YOU THINK ABOUT THE ROAD RULES NOW YOU CAN DRIVE WITHOUT A SUPERVISOR.

For all of these questions, 'road rules' also includes the graduated driver licensing restrictions you have to follow now you have your Provisional licence. When we ask about 'bending the road rules', this means any time you did not follow the road rules completely, and includes things like going over the speed limit by any amount, reading a text on your mobile while you are driving, or following the car in front a little too closely.

How much do agree with the following statements?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
Road rules are for other drivers.	○	○	○	○	○	○	○
It's okay to bend the road rules when I want to.	○	○	○	○	○	○	○
It's sometimes okay to bend the road rules.	○	○	○	○	○	○	○
Everybody has fun on the road. who cares about the road rules?	○	○	○	○	○	○	○
More bad than good comes from ignoring the road rules.	○	○	○	○	○	○	○
Road rules are made to be bent.	○	○	○	○	○	○	○
Not following the road rules is not worth the risks involved.	○	○	○	○	○	○	○
It's easy to stay safe and follow the road rules.	○	○	○	○	○	○	○
Following the road rules is something drivers shouldn't have to think about, it should just happen.	○	○	○	○	○	○	○
It's okay to bend the road rules if no-one gets hurt.	○	○	○	○	○	○	○
Road rules are just a guide for drivers.	○	○	○	○	○	○	○
You can't follow the road rules all the time.	○	○	○	○	○	○	○



What about your agreement with these statements?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
When I drove in a risky way, I did so because I remembered my parents did it too.	○	○	○	○	○	○	○
Seeing other novice drivers bend the road rules influenced me to do the same.	○	○	○	○	○	○	○
When I bent the road rules, I did so because I saw this done by other novice drivers.	○	○	○	○	○	○	○
Seeing my parents bend some road rules influenced me to bend some road rules.	○	○	○	○	○	○	○
When I drove in a risky way, I did so because I remembered my friends did it too.	○	○	○	○	○	○	○
Seeing my friends bend the road rules influenced me to bend some road rules.	○	○	○	○	○	○	○

Think about the driving you will do over the next year. How likely is it that you will bend the road rules?

Very unlikely			Unsure			Very likely
○	○	○	○	○	○	○

Thinking about your driving over the last six months, how much do you agree with the following statements?

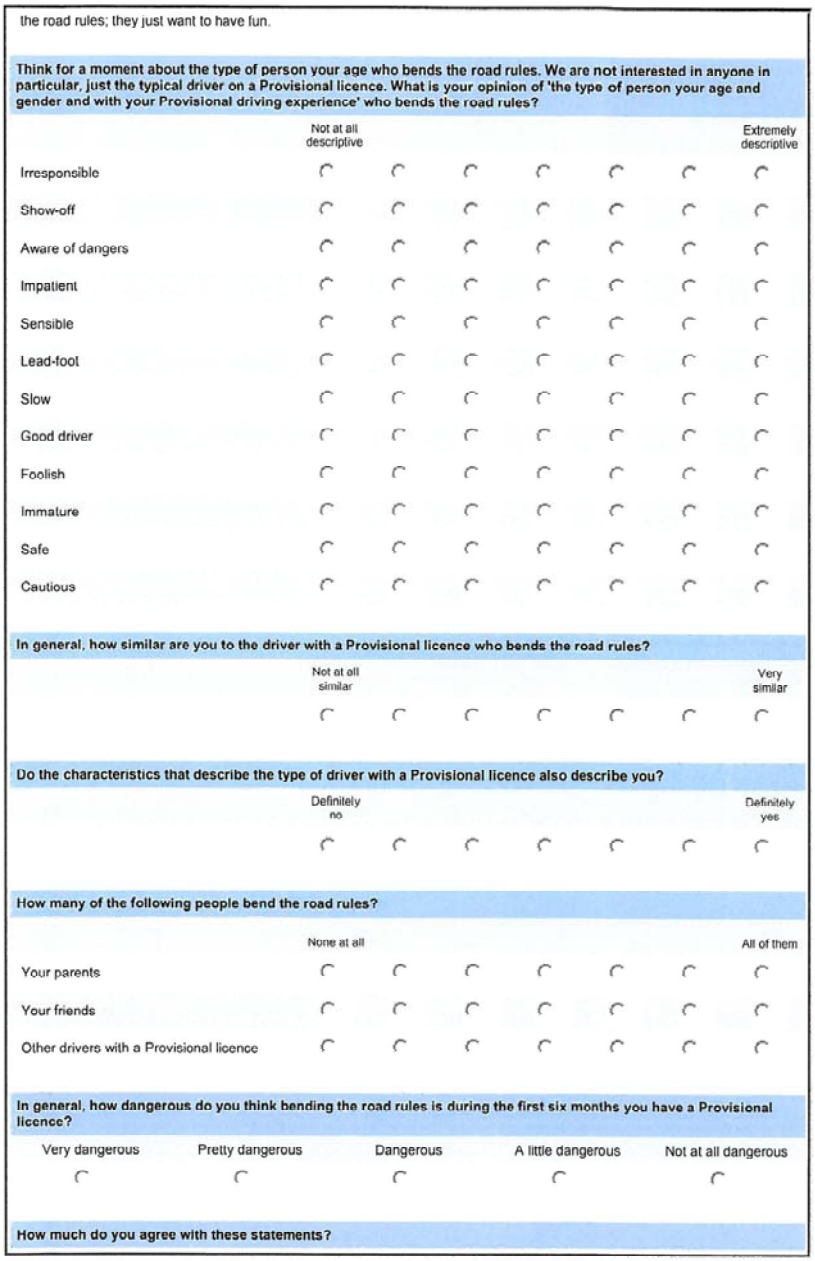
	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
My mates wouldn't have travelled as my passengers because I bent the road rules.	○	○	○	○	○	○	○
Following all the road rules didn't let me have fun when I was driving.	○	○	○	○	○	○	○
Overall, bending the road rules was not worth the risks.	○	○	○	○	○	○	○
Overall, more bad than good comes from bending the road rules.	○	○	○	○	○	○	○
Bending the road rules meant I could have gotten a lecture or a fine from a police officer.	○	○	○	○	○	○	○
Not following the road rules sometimes meant more wear and tear on my car, such as replacing tyres sooner.	○	○	○	○	○	○	○
I would have felt great if I had bent the road rules.	○	○	○	○	○	○	○
Never bending any rules on the road made the journey boring.	○	○	○	○	○	○	○
My mates liked to travel with me because I bent the road rules and made the trip more exciting.	○	○	○	○	○	○	○
Weaving in and out of traffic would have gotten me to my destination sooner.	○	○	○	○	○	○	○

How much would you have agreed with the following statements over the last six months?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
Bending the road rules meant I could go where I wanted when I wanted.	○	○	○	○	○	○	○
My friends would have thought I was really stupid if I bent the road rules.	○	○	○	○	○	○	○
Taking risks on the road like bending the rules gave me a thrill.	○	○	○	○	○	○	○
Showing off in the car made me feel good.	○	○	○	○	○	○	○
I would have lost the respect of my friends and family if they knew I had bent the road rules.	○	○	○	○	○	○	○
Bending the road rules made me feel bad.	○	○	○	○	○	○	○
Bending the road rules made me popular with my friends.	○	○	○	○	○	○	○
My parents wouldn't have been concerned if they found out I had bent the road rules.	○	○	○	○	○	○	○
My friends made fun of me if I didn't fool around in the car.	○	○	○	○	○	○	○
Bending the road rules like speeding saved me time.	○	○	○	○	○	○	○

What about for these items?

	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
The people I mix with a lot don't follow the road rules.	○	○	○	○	○	○	○
My friends don't follow all the road rules all the time.	○	○	○	○	○	○	○
The people I consider most important to me don't mind bending the road rules now and then.	○	○	○	○	○	○	○
My parents follow all the road rules all the time.	○	○	○	○	○	○	○
My parents think it is fine to bend the road rules.	○	○	○	○	○	○	○
My friends think it is okay to bend the road rules.	○	○	○	○	○	○	○
The people I have known for a long time follow all the road rules.	○	○	○	○	○	○	○
The people I spend the most time with make sure they don't bend the road rules.	○	○	○	○	○	○	○
The people who were influential in my early years of life don't worry about following all the road rules.	○	○	○	○	○	○	○
Other young drivers I know fool around while driving.	○	○	○	○	○	○	○
My friends aren't concerned about following	○	○	○	○	○	○	○



the road rules; they just want to have fun.

Think for a moment about the type of person your age who bends the road rules. We are not interested in anyone in particular, just the typical driver on a Provisional licence. What is your opinion of 'the type of person your age and gender and with your Provisional driving experience' who bends the road rules?

	Not at all descriptive						Extremely descriptive
Irresponsible	○	○	○	○	○	○	○
Show-off	○	○	○	○	○	○	○
Aware of dangers	○	○	○	○	○	○	○
Impatient	○	○	○	○	○	○	○
Sensible	○	○	○	○	○	○	○
Lead-fool	○	○	○	○	○	○	○
Slow	○	○	○	○	○	○	○
Good driver	○	○	○	○	○	○	○
Foolish	○	○	○	○	○	○	○
Immature	○	○	○	○	○	○	○
Safe	○	○	○	○	○	○	○
Cautious	○	○	○	○	○	○	○

In general, how similar are you to the driver with a Provisional licence who bends the road rules?

Not at all similar						Very similar
○	○	○	○	○	○	○

Do the characteristics that describe the type of driver with a Provisional licence also describe you?

Definitely no						Definitely yes
○	○	○	○	○	○	○

How many of the following people bend the road rules?

	None at all						All of them
Your parents	○	○	○	○	○	○	○
Your friends	○	○	○	○	○	○	○
Other drivers with a Provisional licence	○	○	○	○	○	○	○

In general, how dangerous do you think bending the road rules is during the first six months you have a Provisional licence?

Very dangerous	Pretty dangerous	Dangerous	A little dangerous	Not at all dangerous
○	○	○	○	○

How much do you agree with these statements?

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
I would like to take off on a trip with no pre-planned routes or timetables.	○	○	○	○	○
I like wild parties.	○	○	○	○	○
I like to do frightening things.	○	○	○	○	○
I get restless when I spend too much time at home.	○	○	○	○	○
I would like to try bungee jumping.	○	○	○	○	○
I would like to explore strange places.	○	○	○	○	○
I would love to have new and exciting experiences, even if they are illegal.	○	○	○	○	○
I prefer friends who are excitingly unpredictable.	○	○	○	○	○

FOR THESE NEXT FEW QUESTIONS, PLEASE IMAGINE YOU BEND THE ROAD RULES, EVEN IF YOU DON'T.

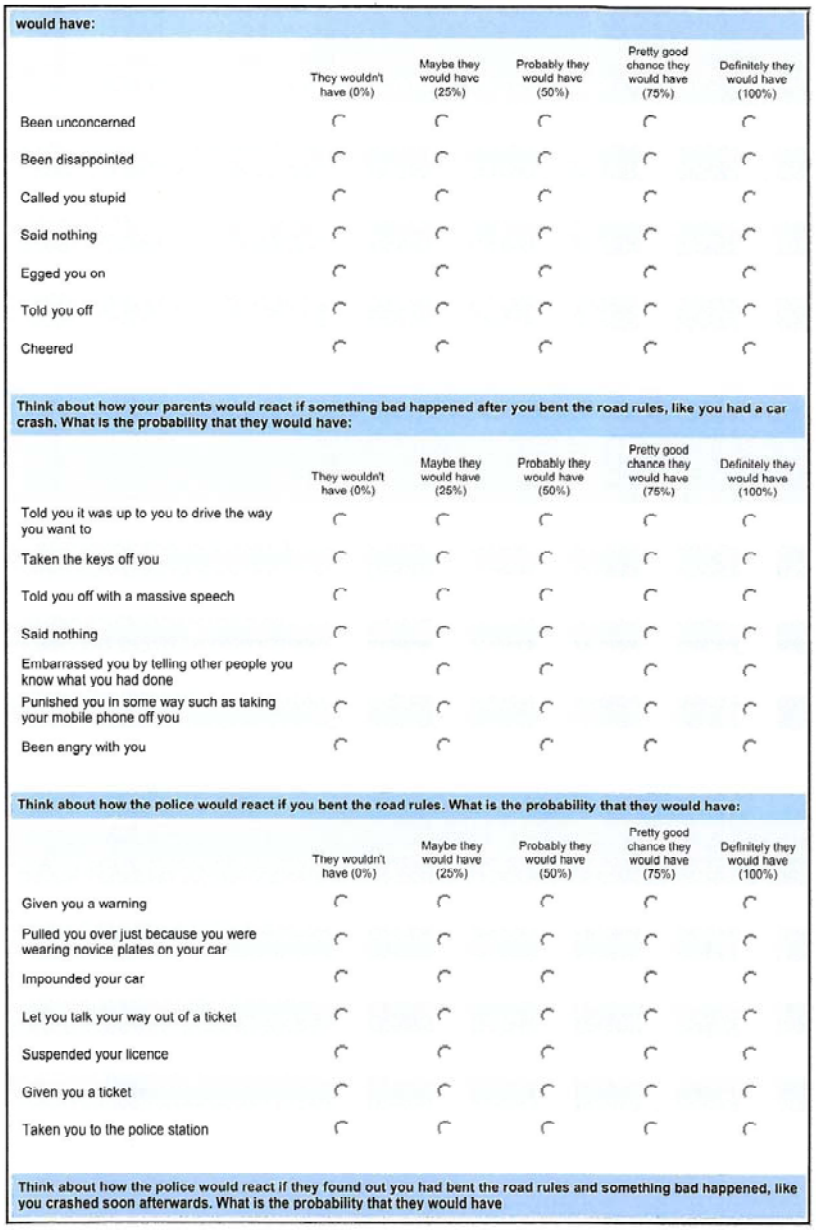
Think about how your friends would react if they found out you bent the road rules. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Told you off	○	○	○	○	○
Said nothing	○	○	○	○	○
Been disappointed	○	○	○	○	○
Been unconcerned	○	○	○	○	○
Cheered	○	○	○	○	○
Egged you on	○	○	○	○	○
Called you stupid	○	○	○	○	○

Now think about how your friends would react if they found out you bent the road rules and something bad happened, like you had a car crash. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Told you off	○	○	○	○	○
Said nothing	○	○	○	○	○
Been disappointed	○	○	○	○	○
Been unconcerned	○	○	○	○	○
Cheered	○	○	○	○	○
Egged you on	○	○	○	○	○
Called you stupid	○	○	○	○	○

Think about how your parents would react if they found out you bend the road rules. What is the probability that they



would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Been unconcerned	○	○	○	○	○
Been disappointed	○	○	○	○	○
Called you stupid	○	○	○	○	○
Said nothing	○	○	○	○	○
Egged you on	○	○	○	○	○
Told you off	○	○	○	○	○
Cheered	○	○	○	○	○

Think about how your parents would react if something bad happened after you bent the road rules, like you had a car crash. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Told you it was up to you to drive the way you want to	○	○	○	○	○
Taken the keys off you	○	○	○	○	○
Told you off with a massive speech	○	○	○	○	○
Said nothing	○	○	○	○	○
Embarrassed you by telling other people you know what you had done	○	○	○	○	○
Punished you in some way such as taking your mobile phone off you	○	○	○	○	○
Been angry with you	○	○	○	○	○

Think about how the police would react if you bent the road rules. What is the probability that they would have:

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Given you a warning	○	○	○	○	○
Pulled you over just because you were wearing novice plates on your car	○	○	○	○	○
Impounded your car	○	○	○	○	○
Let you talk your way out of a ticket	○	○	○	○	○
Suspended your licence	○	○	○	○	○
Given you a ticket	○	○	○	○	○
Taken you to the police station	○	○	○	○	○

Think about how the police would react if they found out you had bent the road rules and something bad happened, like you crashed soon afterwards. What is the probability that they would have

	They wouldn't have (0%)	Maybe they would have (25%)	Probably they would have (50%)	Pretty good chance they would have (75%)	Definitely they would have (100%)
Given you a warning	○	○	○	○	○
Given you a ticket	○	○	○	○	○
Impounded your car	○	○	○	○	○
Taken you to the police station	○	○	○	○	○
Suspended your licence	○	○	○	○	○
Let you talk your way out of a ticket	○	○	○	○	○

Have you been caught committing any driving offences while you have had a Provisional licence?

No (Go to Q 39)	Yes
○	○

If yes, what offences have you been caught for? (please select all that apply)

- ☐ Speeding
- ☐ Failure to give way
- ☐ Driving under the influence
- ☐ Failure to display your P plates
- ☐ Other: _____

If yes, what penalties did you receive? (please select all that apply)

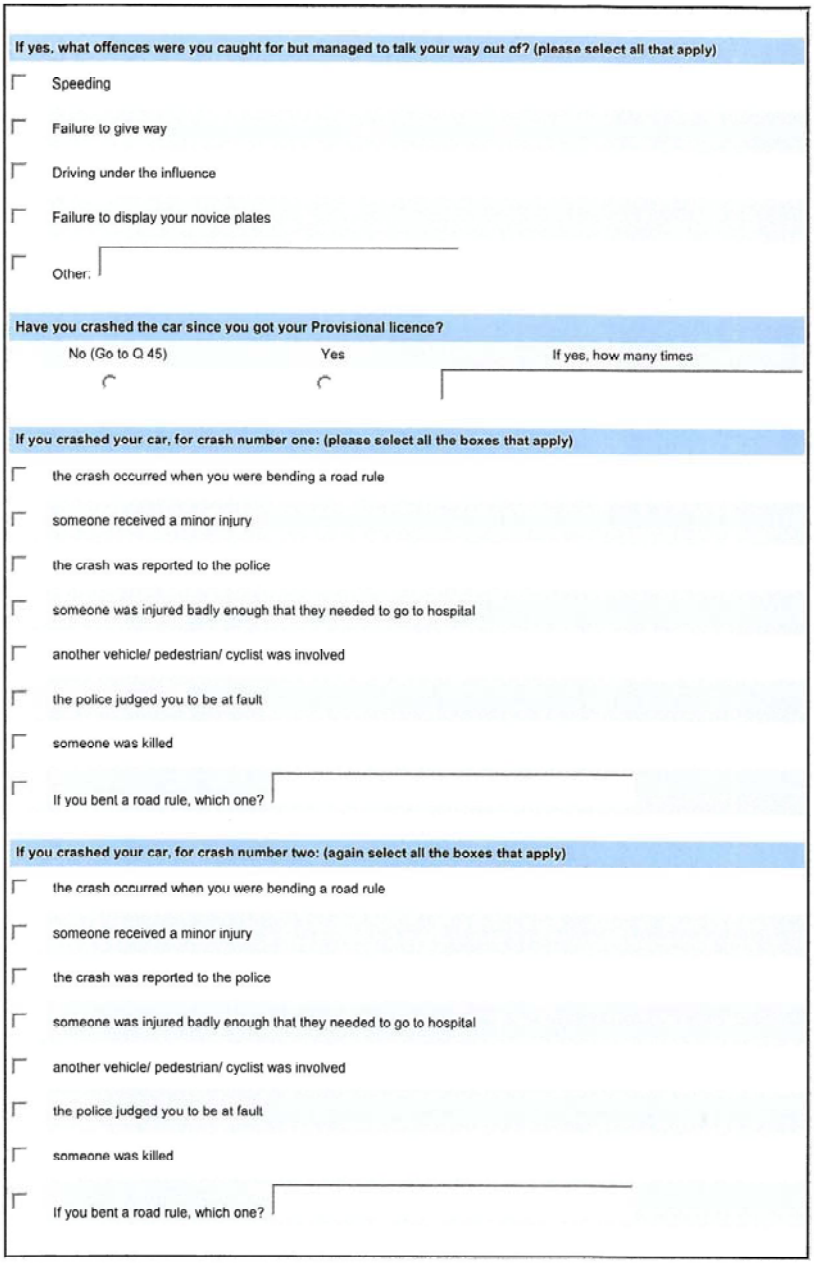
- ☐ Warning
- ☐ Ticket/ Fine
- ☐ Notice to appear in Court
- ☐ Vehicle impoundment
- ☐ Demerit points
- ☐ Other: _____

Have you bent any road rules since you got your Provisional licence, but Mum or Dad took the fine and/ or demerit points for you? Please remember this information is confidential.

No	Yes	If yes, how many times?
○	○	_____

Have you been pulled over by the police since you got your Provisional licence, but you managed to talk your way out of a ticket?

No (Go to Q 42)	Yes	If yes, how many times?
○	○	_____



If yes, what offences were you caught for but managed to talk your way out of? (please select all that apply)

- ☐ Speeding
- ☐ Failure to give way
- ☐ Driving under the influence
- ☐ Failure to display your novice plates
- ☐ Other:

Have you crashed the car since you got your Provisional licence?

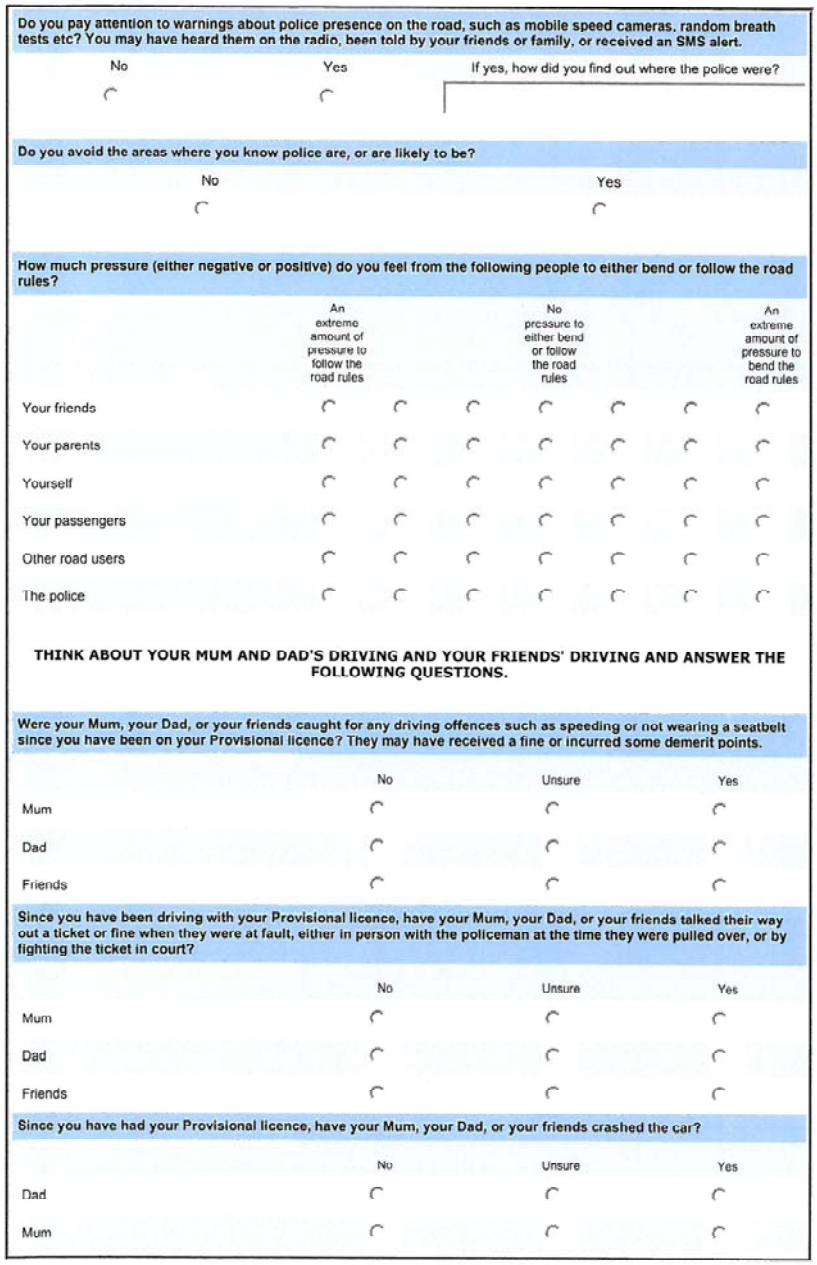
No (Go to Q 45)	Yes	If yes, how many times
○	○	

If you crashed your car, for crash number one: (please select all the boxes that apply)

- ☐ the crash occurred when you were bending a road rule
- ☐ someone received a minor injury
- ☐ the crash was reported to the police
- ☐ someone was injured badly enough that they needed to go to hospital
- ☐ another vehicle/ pedestrian/ cyclist was involved
- ☐ the police judged you to be at fault
- ☐ someone was killed
- ☐ If you bent a road rule, which one?

If you crashed your car, for crash number two: (again select all the boxes that apply)

- ☐ the crash occurred when you were bending a road rule
- ☐ someone received a minor injury
- ☐ the crash was reported to the police
- ☐ someone was injured badly enough that they needed to go to hospital
- ☐ another vehicle/ pedestrian/ cyclist was involved
- ☐ the police judged you to be at fault
- ☐ someone was killed
- ☐ If you bent a road rule, which one?



Do you pay attention to warnings about police presence on the road, such as mobile speed cameras, random breath tests etc? You may have heard them on the radio, been told by your friends or family, or received an SMS alert.

No	Yes	If yes, how did you find out where the police were?
○	○	

Do you avoid the areas where you know police are, or are likely to be?

No	Yes
○	○

How much pressure (either negative or positive) do you feel from the following people to either bend or follow the road rules?

	An extreme amount of pressure to follow the road rules			No pressure to either bend or follow the road rules			An extreme amount of pressure to bend the road rules
Your friends	○	○	○	○	○	○	○
Your parents	○	○	○	○	○	○	○
Yourself	○	○	○	○	○	○	○
Your passengers	○	○	○	○	○	○	○
Other road users	○	○	○	○	○	○	○
The police	○	○	○	○	○	○	○

THINK ABOUT YOUR MUM AND DAD'S DRIVING AND YOUR FRIENDS' DRIVING AND ANSWER THE FOLLOWING QUESTIONS.

Were your Mum, your Dad, or your friends caught for any driving offences such as speeding or not wearing a seatbelt since you have been on your Provisional licence? They may have received a fine or incurred some demerit points.

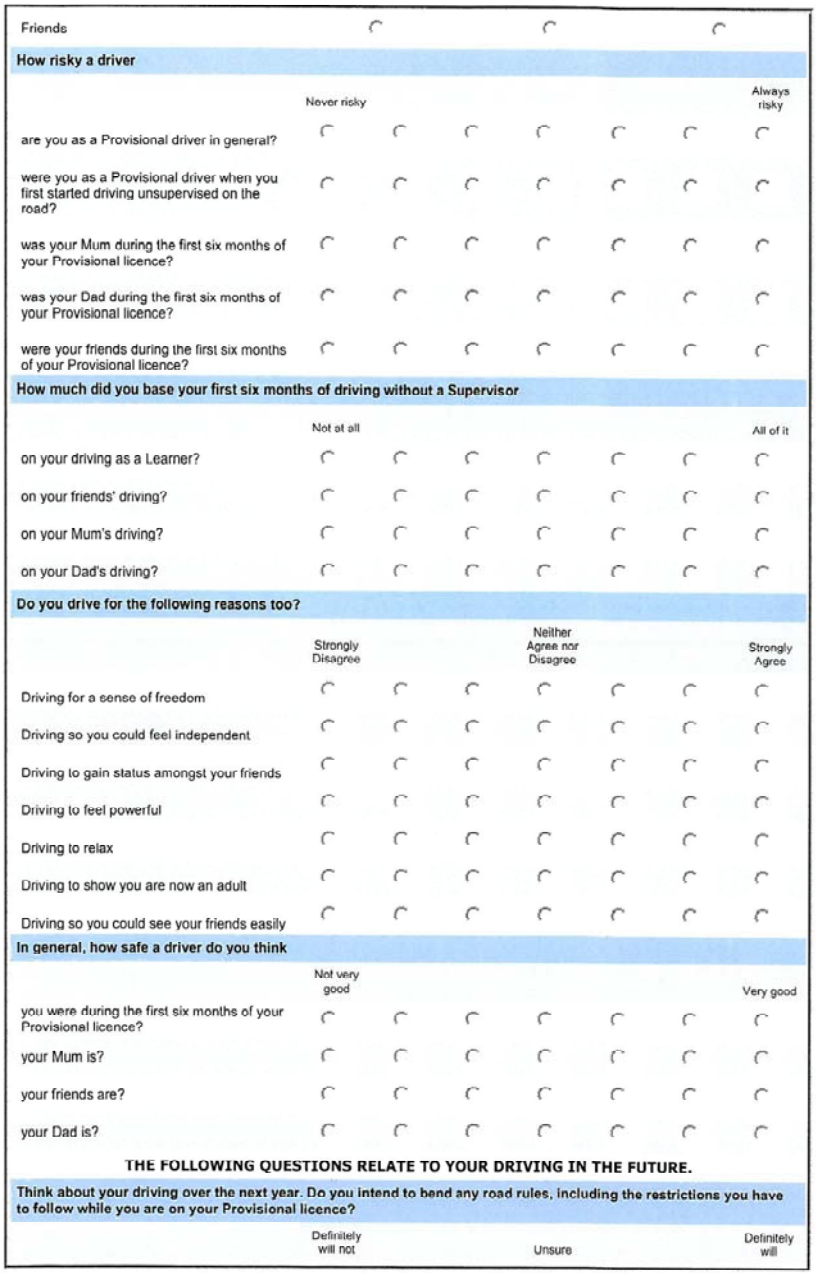
	No	Unsure	Yes
Mum	○	○	○
Dad	○	○	○
Friends	○	○	○

Since you have been driving with your Provisional licence, have your Mum, your Dad, or your friends talked their way out a ticket or fine when they were at fault, either in person with the policeman at the time they were pulled over, or by fighting the ticket in court?

	No	Unsure	Yes
Mum	○	○	○
Dad	○	○	○
Friends	○	○	○

Since you have had your Provisional licence, have your Mum, your Dad, or your friends crashed the car?

	No	Unsure	Yes
Dad	○	○	○
Mum	○	○	○



Friends	○		○		○		
How risky a driver							
	Never risky						Always risky
are you as a Provisional driver in general?	○	○	○	○	○	○	○
were you as a Provisional driver when you first started driving unsupervised on the road?	○	○	○	○	○	○	○
was your Mum during the first six months of your Provisional licence?	○	○	○	○	○	○	○
was your Dad during the first six months of your Provisional licence?	○	○	○	○	○	○	○
were your friends during the first six months of your Provisional licence?	○	○	○	○	○	○	○
How much did you base your first six months of driving without a Supervisor							
	Not at all						All of it
on your driving as a Learner?	○	○	○	○	○	○	○
on your friends' driving?	○	○	○	○	○	○	○
on your Mum's driving?	○	○	○	○	○	○	○
on your Dad's driving?	○	○	○	○	○	○	○
Do you drive for the following reasons too?							
	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
Driving for a sense of freedom	○	○	○	○	○	○	○
Driving so you could feel independent	○	○	○	○	○	○	○
Driving to gain status amongst your friends	○	○	○	○	○	○	○
Driving to feel powerful	○	○	○	○	○	○	○
Driving to relax	○	○	○	○	○	○	○
Driving to show you are now an adult	○	○	○	○	○	○	○
Driving so you could see your friends easily	○	○	○	○	○	○	○
In general, how safe a driver do you think							
	Not very good						Very good
you were during the first six months of your Provisional licence?	○	○	○	○	○	○	○
your Mum is?	○	○	○	○	○	○	○
your friends are?	○	○	○	○	○	○	○
your Dad is?	○	○	○	○	○	○	○
THE FOLLOWING QUESTIONS RELATE TO YOUR DRIVING IN THE FUTURE.							
Think about your driving over the next year. Do you intend to bend any road rules, including the restrictions you have to follow while you are on your Provisional licence?							
	Definitely will not			Unsure			Definitely will

	○	○	○	○	○	○	○

Imagine you are in the following situation. It is late on a Saturday night and you are at a party with a group of friends. You drove your friends to the party in your car. One of your friends was going to stay sober and drive you and your other friends home in your car. You have been drinking. The person who was going to drive you home has had so much to drink they have gone to sleep. How willing would you be to do each of the following?

	Very unwilling			Unsure			Very willing
Drive to where you can catch public transport	○	○	○	○	○	○	○
Drive to a friends' house to stay the night	○	○	○	○	○	○	○
Drive home	○	○	○	○	○	○	○
Drive your friends, then yourself, home	○	○	○	○	○	○	○
Ask to stay over	○	○	○	○	○	○	○
Sleep in your car	○	○	○	○	○	○	○
Call a taxi	○	○	○	○	○	○	○
Call family to collect you	○	○	○	○	○	○	○

Now you are in this situation: You are driving late at night, and you come to an intersection with a red light. You can't see any police or a camera. How willing would you be to:

	Very unwilling			Unsure			Very willing
Drive through the red light	○	○	○	○	○	○	○
Speed up when you get to the red light	○	○	○	○	○	○	○
Stop at the red light	○	○	○	○	○	○	○
Slow down for the red light but keep driving slowly	○	○	○	○	○	○	○

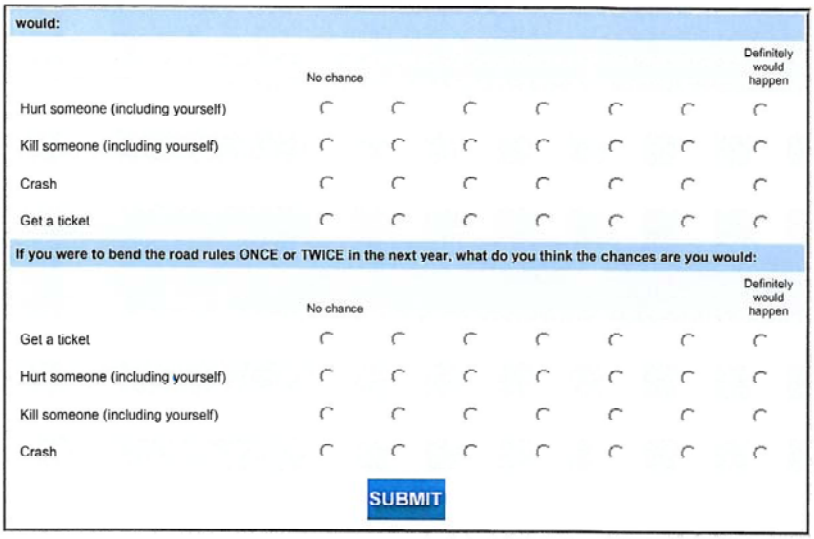
You are driving at the speed limit with friends in the car. You can't see any police or cameras around. Your friends suggest you drive faster. What are you willing to do in this situation?

	Very unwilling			Unsure			Very willing
Go a little bit faster	○	○	○	○	○	○	○
Go a fair bit faster	○	○	○	○	○	○	○
Go a lot faster	○	○	○	○	○	○	○
Stick to the speed limit	○	○	○	○	○	○	○

You are at a party, and it is just after midnight. You are about to go home, and your friends ask you for a lift in your car. How willing would you be to:

	Very unwilling			Unsure			Very willing
Tell them to take a taxi	○	○	○	○	○	○	○
Tell them to get a lift with someone else	○	○	○	○	○	○	○
Tell them to stay over at the party	○	○	○	○	○	○	○
Tell them no	○	○	○	○	○	○	○
Tell them to catch a bus or walk home	○	○	○	○	○	○	○
Give them a lift	○	○	○	○	○	○	○

If you were to bend the road rules regularly (say TWICE A WEEK for a year), what do you think the chances are you



would:

	No chance						Definitely would happen
Hurt someone (including yourself)	○	○	○	○	○	○	○
Kill someone (including yourself)	○	○	○	○	○	○	○
Crash	○	○	○	○	○	○	○
Get a ticket	○	○	○	○	○	○	○

If you were to bend the road rules ONCE or TWICE in the next year, what do you think the chances are you would:

	No chance						Definitely would happen
Get a ticket	○	○	○	○	○	○	○
Hurt someone (including yourself)	○	○	○	○	○	○	○
Kill someone (including yourself)	○	○	○	○	○	○	○
Crash	○	○	○	○	○	○	○

SUBMIT

Appendix F: Behavioural items that loaded less than .40 or loaded on two or more factors

You drove with the stereo up really loud

Your passengers had their mobile on loudspeaker

You changed your mind about your destination mid-journey

You didn't give way to traffic (e.g. already on the roundabout or at a give way sign)

You drove without having a destination in mind

You drove a small car, such as a hatchback

You overtook a car illegally

You carried more passengers than you were allowed to under the graduated driver licensing restrictions passenger limits

You took chances for the fun of it when driving in traffic

You made a lane change when there probably wasn't enough room to do so

You sent or replied to a text while driving

You raced with other drivers

You found yourself driving when you were really "pumped up"

You yelled or used rude gestures at another driver who had cut you off

You didn't always display your novice plates

You followed someone who had cut you off

You didn't stop at a stop sign or a red light

You drove over the white centre line when you weren't overtaking

You drove a car that was more than 10 years old

Appendix G: The Behaviour of Young Novice Drivers Scale (BYNDS)

The Behaviour of Young Novice Drivers Scale (BYNDS) Scott-Parker, B., Watson, B., & King, M. J. (2010). The risky behaviour of young drivers: Developing a measurement tool. *Proceedings of the 24th Canadian Multidisciplinary Road Safety Conference, Niagara Falls, Canada, June 6-9, 2010.*						
Whilst you have been driving on your Provisional driver's licence, how often have you done the following behaviours?	Never	Occas-ionally	Some-Times	Usually	Nearly all the time	CODE
You drove over the speed limit in areas where it was unlikely there was a radar or speed camera	1	2	3	4	5	TR
You went 10-20 km/hr over the speed limit (e.g., 72 km/hr in a 60 km/hr, 112 km/hr in a 100 km/hr)	1	2	3	4	5	TR
You deliberately sped when overtaking	1	2	3	4	5	TR
You sped at night on roads that were not well lit	1	2	3	4	5	TR
You went up to 10 km/hr over the speed limit (e.g. 65 km/hr in a 60 km/hr, 105 km/hr in a 100 km/hr)	1	2	3	4	5	TR
You went more than 20 km/hr over the speed limit (e.g. 60 km/hr in a 40 km/hr, 100 km/hr in an 80 km/hr)	1	2	3	4	5	TR
You raced out of an intersection when the light went green	1	2	3	4	5	TR
You travelled in the right lane on multi-lane highways	1	2	3	4	5	TR
You sped up when the lights went yellow	1	2	3	4	5	TR
You went too fast around a corner	1	2	3	4	5	TR
You did an illegal u-turn	1	2	3	4	5	TR
You overtook a car on the left	1	2	3	4	5	TR
You spoke on a mobile that you held in your hands	1	2	3	4	5	TR
Your passengers didn't wear seatbelts	1	2	3	4	5	FI
You drove after taking an illicit drug such as marijuana or ecstasy	1	2	3	4	5	FI
You carried more passengers than could legally fit in your car	1	2	3	4	5	FI
You didn't always wear your seatbelt	1	2	3	4	5	FI
You drove without a valid licence because you hadn't applied for one yet or it had been suspended	1	2	3	4	5	FI
You didn't wear a seatbelt if it was only for a short trip	1	2	3	4	5	FI
If there was no red light camera, you drove through intersections on a red light	1	2	3	4	5	FI
You carried more passengers than there were seatbelts for in your car	1	2	3	4	5	FI
You drove when you thought you may	1	2	3	4	5	FI

have been over the legal alcohol limit						
You drove a high-powered vehicle	1	2	3	4	5	FI
You misjudged the speed when you were exiting a main road	1	2	3	4	5	MS
You misjudged the speed of an oncoming vehicle	1	2	3	4	5	MS
You misjudged the gap when you were turning right	1	2	3	4	5	MS
You misjudged the stopping distance you needed	1	2	3	4	5	MS
You turned right into the path of another vehicle	1	2	3	4	5	MS
You misjudged the gap when you were overtaking another vehicle	1	2	3	4	5	MS
You missed your exit or turn	1	2	3	4	5	MS
You entered the road in front of another vehicle	1	2	3	4	5	MS
You didn't always indicate when you were changing lanes	1	2	3	4	5	MS
You drove on the weekend	1	2	3	4	5	EX
You drove in the rain	1	2	3	4	5	EX
You drove at peak times in the morning and afternoon	1	2	3	4	5	EX
You drove at night	1	2	3	4	5	EX
You drove at dusk or dawn	1	2	3	4	5	EX
You carried your friends as passengers at night	1	2	3	4	5	EX
You drove when you knew you were tired	1	2	3	4	5	EX
Your car was full of your friends as passengers	1	2	3	4	5	EX
You went for a drive with your mates giving directions to where they wanted to go	1	2	3	4	5	EX
Your driving was affected by negative emotions like anger or frustration	1	2	3	4	5	DM
You allowed your driving style to be influenced by what mood you were in	1	2	3	4	5	DM
You drove faster if you were in a bad mood	1	2	3	4	5	DM

TR – Transient rule violations

FI – Fixed rule violations

MS – Misjudgement

EX – Risky driving exposure

DM – Driver mood