Submission No. 58

INQUIRY INTO YOUNG DRIVER SAFETY AND EDUCATION PROGRAMS

Organisation: Australian Transport Safety Bureau

Name: Mr Joe Motha

Position: General Manager, Road Safety

Date Received: 20/12/2007

Australian Government

Australian Transport Safety Bureau

A submission to the NSW Staysafe Committee's Inquiry into Young Driver Safety and Education Programmes

Road crashes involving young road users: statistical overview

The over-representation of young drivers[1] in fatal and serious injury crashes is an issue of serious concern for all governments in Australia. Road crashes continue to be one of the main causes of death for young adults in Australia. Australian Bureau of Statistics data show that in 2004, transport accidents accounted for 32 per cent of all deaths for people 15 to 24 years old.

Table 1 shows the number of road deaths and serious injuries among people 15-24 years old as a proportion of all road deaths and serious injuries, for both males and females. Data are provided for 2003-04 (the latest period for which serious injury data are available), and the 12 months to October 2007 (the latest period for which road death data are available). The table shows that young people account for about one-quarter of all road deaths and a slightly higher proportion of serious injuries; the representation of young people is greater among males than females. In 2006, the 15-24 year age group formed 13.9 per cent of the population in Australia.

Table 1: Proportion of road deaths and serious injuries involving young road users

Road deaths, July 2003-June 2004

	All road users	People aged 15-24 years	Deaths of people 15-24 years old as a proportion of all road user deaths
Males	1122	293	26%
Females	472	104	22%
Persons	1594	397	25%

Persons seriously injured in road crashes, July 2003-June 2004

	All road users	People aged 15-24 years	Serious injuries of people 15-24 years old as a proportion of all road user serious injuries
Males	18 846	5 527	29%
Females	9 934	2 579	26%
Persons	28782	8106	28%

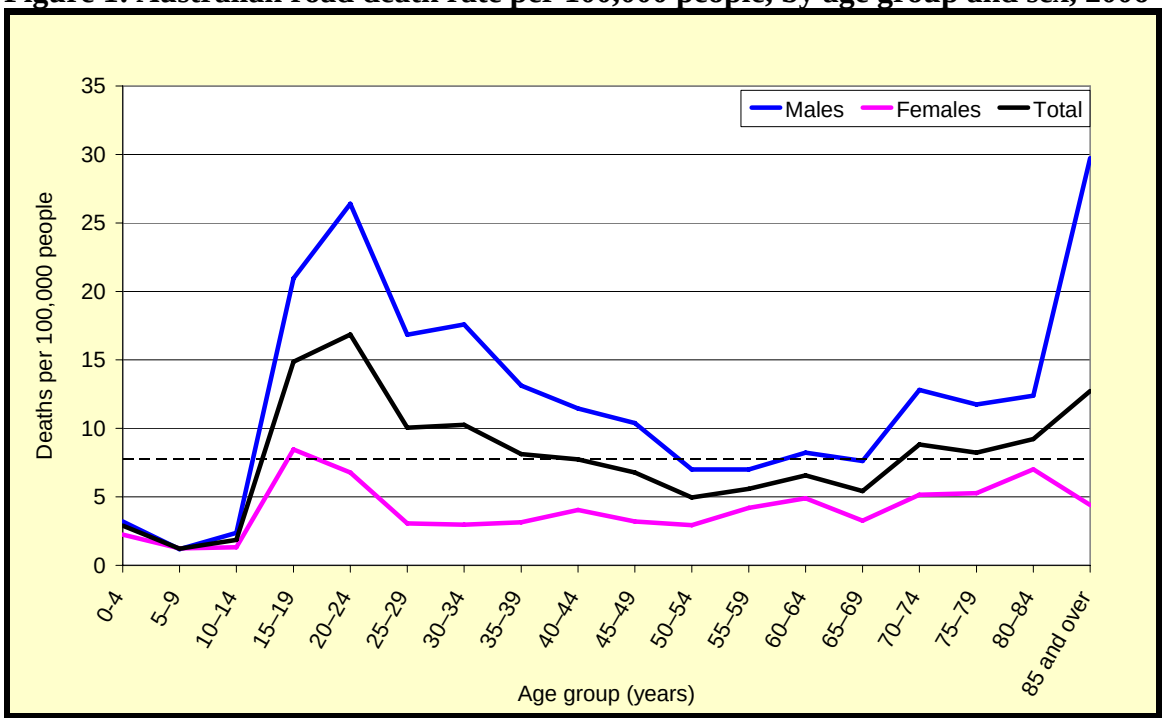
Road deaths, November 2006-October 2007

	All road users	People aged 15-24 years	Deaths of 15-24 year olds as a proportion of all road user deaths
Males	1183	291	25%
Females	429	91	21%
Persons	1612	382	24%

[1] Given the Committee's interest in young driver safety, where possible data has been provided for the 17-24 years age group. In some cases only the 15-24 years range was available.

Figure 1 shows that road death rates for both males and females are higher for 15-24 year old road users than all other age groups (except for males over 84 years of age). Road death rates for males are consistently higher than for females, and the gap is more pronounced in the younger age groups. The elevated rate in the older age groups is partly attributed to the greater physical fragility of older road users: young adults frequently survive crashes that would kill older persons.

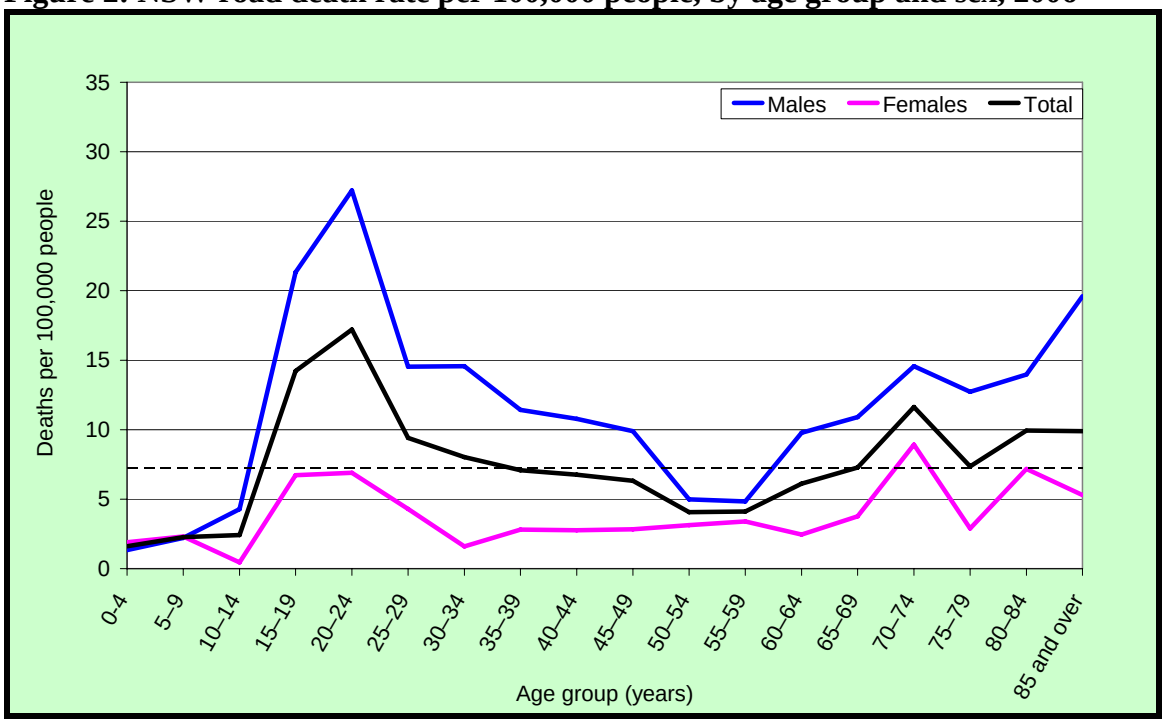
Figure 1: Australian road death rate per 100,000 people, by age group and sex, 2006



Note: The horizontal-dash-line at 7.8 represents the overall 2006 Australian death rate.

Figure 2 and table 2 below show that the pattern of road deaths for NSW is very similar to Australia as a whole.

Figure 2: NSW road death rate per 100,000 people, by age group and sex, 2006



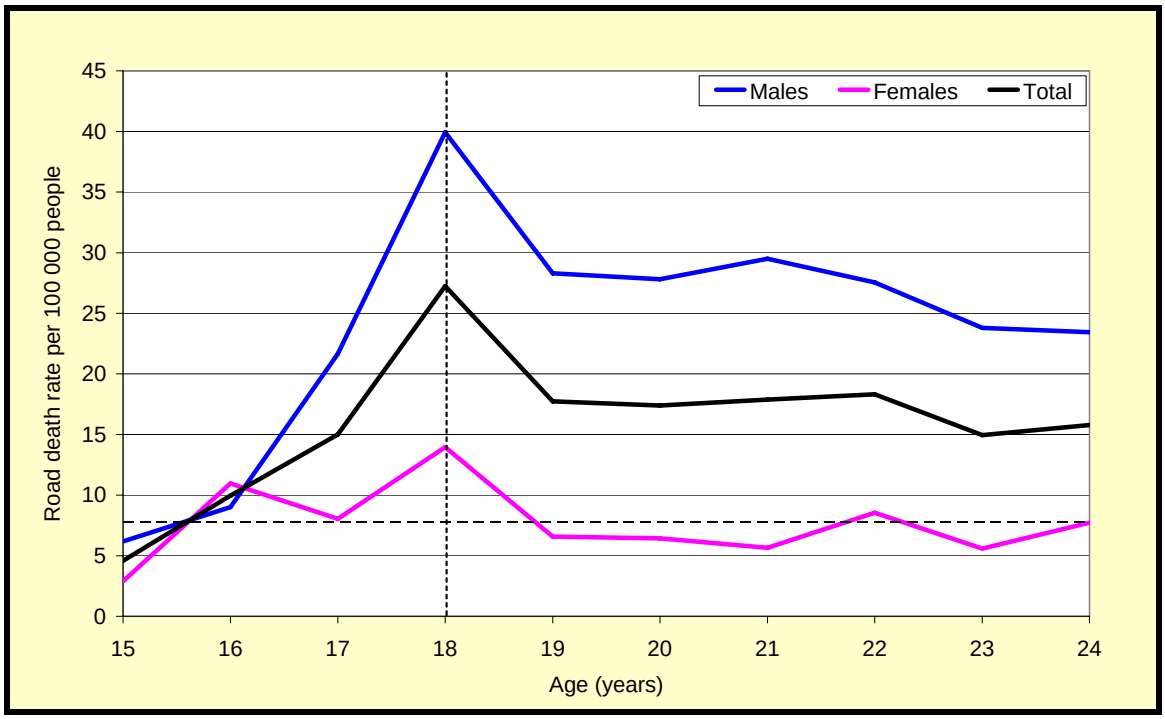
Note: The horizontal-dash-line at 7.3 represents the overall 2006 NSW death rate.

Table 2: Road death rates per 100,000 people, NSW and Australia, 2006

	15-19yrs	20-24yrs	Total death rate
NSW males	21.3	27.2	11.0
Australian males	21.0	26.4	11.6
NSW females	6.7	6.9	3.6
Australian females	8.5	6.8	3.9
NSW total	14.2	17.2	7.3
Australian total	14.9	16.9	7.8

Figure 3 shows the breakdown by age of the road death rate for the 15 to 24 year old group. For both males and females, the death rate peaks at 18 years of age and remains relatively high for several years.

Figure 3: Australian road death rate per 100,000 people for those 15-24 years old, 2006



Note: The horizontal-dash-line at 7.8 represents the overall 2006 Australian death rate.

Over the past sixteen years Australia has seen significant reductions in the number of road deaths. Figure 4 shows that between 1990 and 2006 the road death rate per 100,000 people for the total population decreased (43 per cent), and the rate for the 17-24 year age group decreased by almost the same proportion (42 per cent).

Figure 4: Road death rate per 100,000 people for total population and 17-24 year old age group, 1990 to 2006

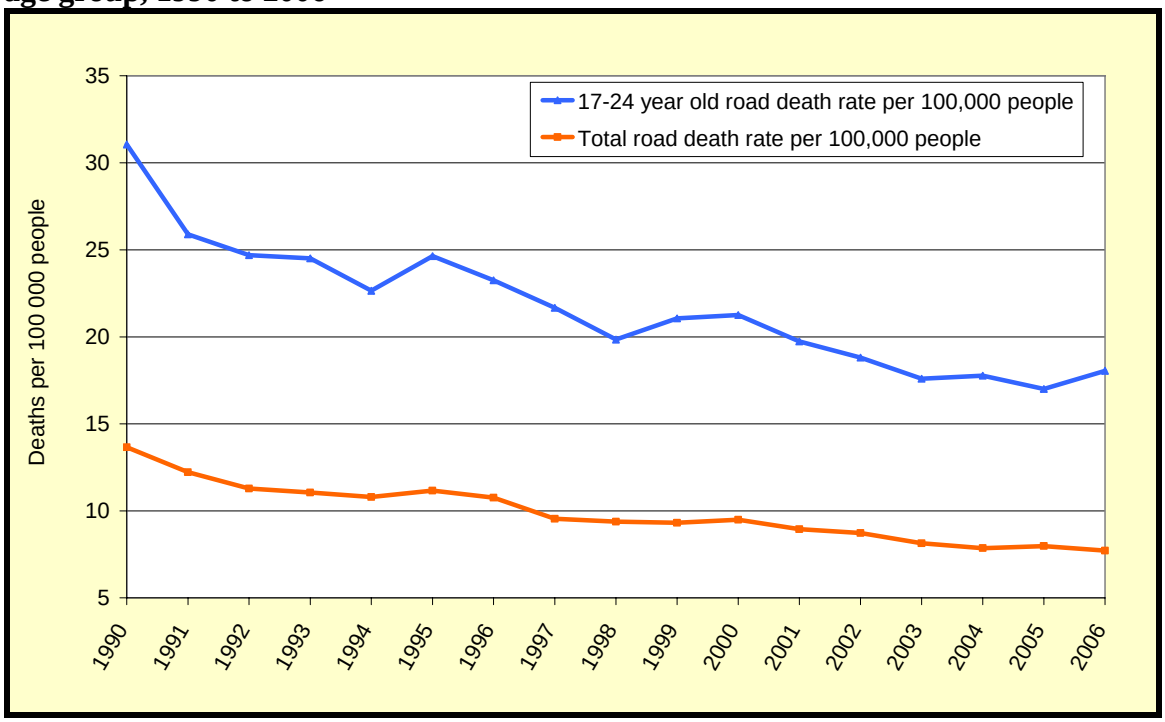
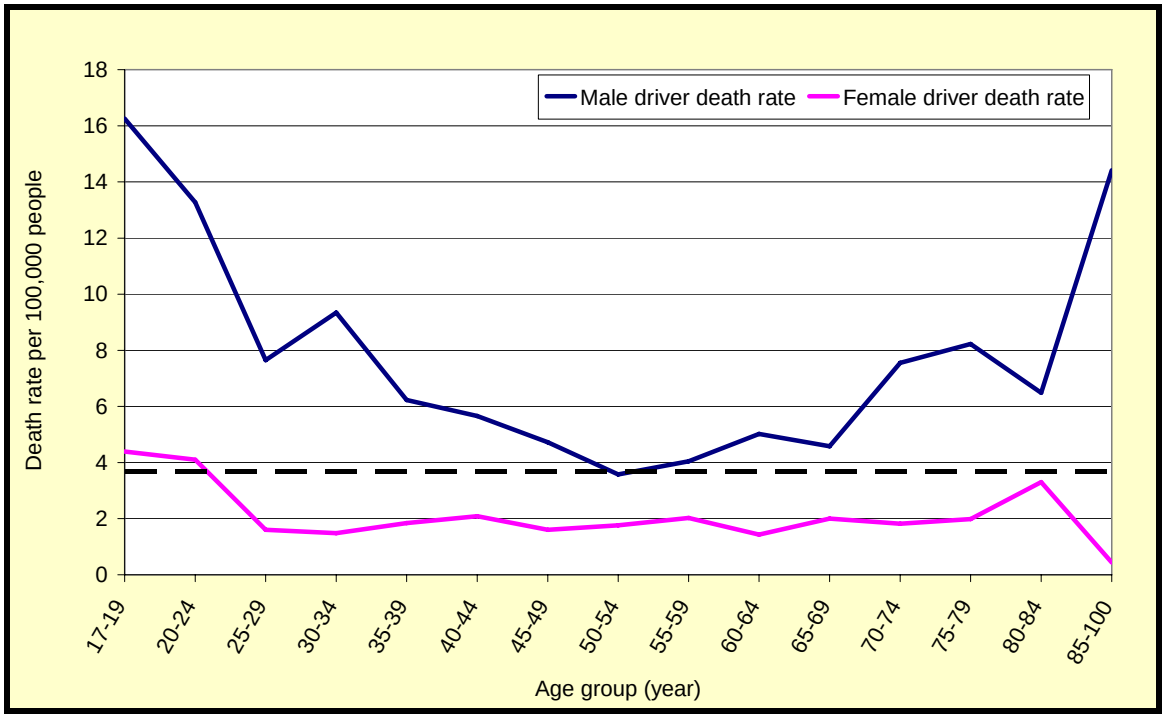


Figure 5 shows the distribution by age and gender of drivers (i.e. excludes motorcycle riders) that were killed in 2006. The road death rate is much higher for young male drivers than for other age groups and female drivers, with the exception of male drivers over 84 years of age.

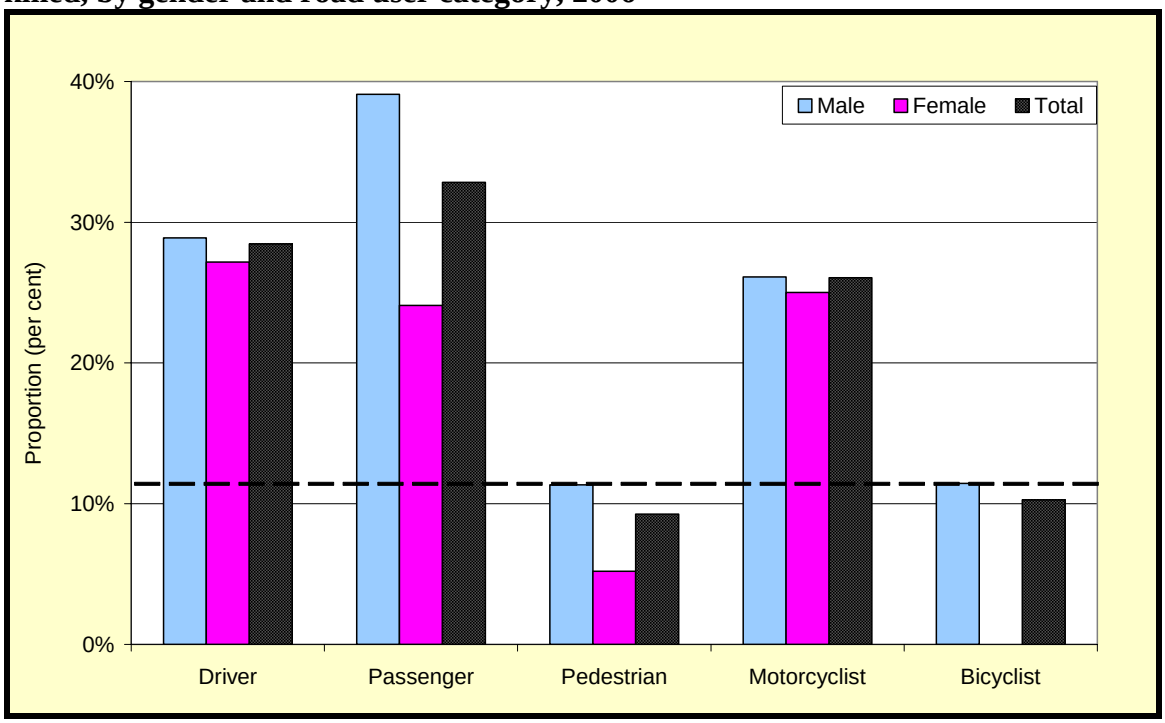
Figure 5: Drivers' road death rate per 100,000 people, by age group and gender, 2006



Note: The horizontal-dash-line at 3.7 represents the overall 2006 Australian drivers' death rate.

Figure 6 shows the proportion of deaths involving young people for different road user categories. Compared with their representation in the general population, people 17 to 24 years old clearly have a high rate of involvement in deaths among drivers, vehicle passengers and motorcyclists. Young people make up a particularly large proportion (40 per cent) of male passenger deaths.

Figure 6: Road users killed in the 17-24 age group as a proportion of all road users killed, by gender and road user category, 2006



Note: The horizontal-dash-line at 11 per cent represents the proportion of 17-24 year olds, of either gender, in the population in 2006.

Figure 7 indicates once again the relatively high number of road deaths in the younger age groups. Compared with older age groups, a very large proportion of deaths of young road users occurs in single-vehicle crashes (figures 7 and 8).

Figure 7: Road deaths by crash type and age group, 2006

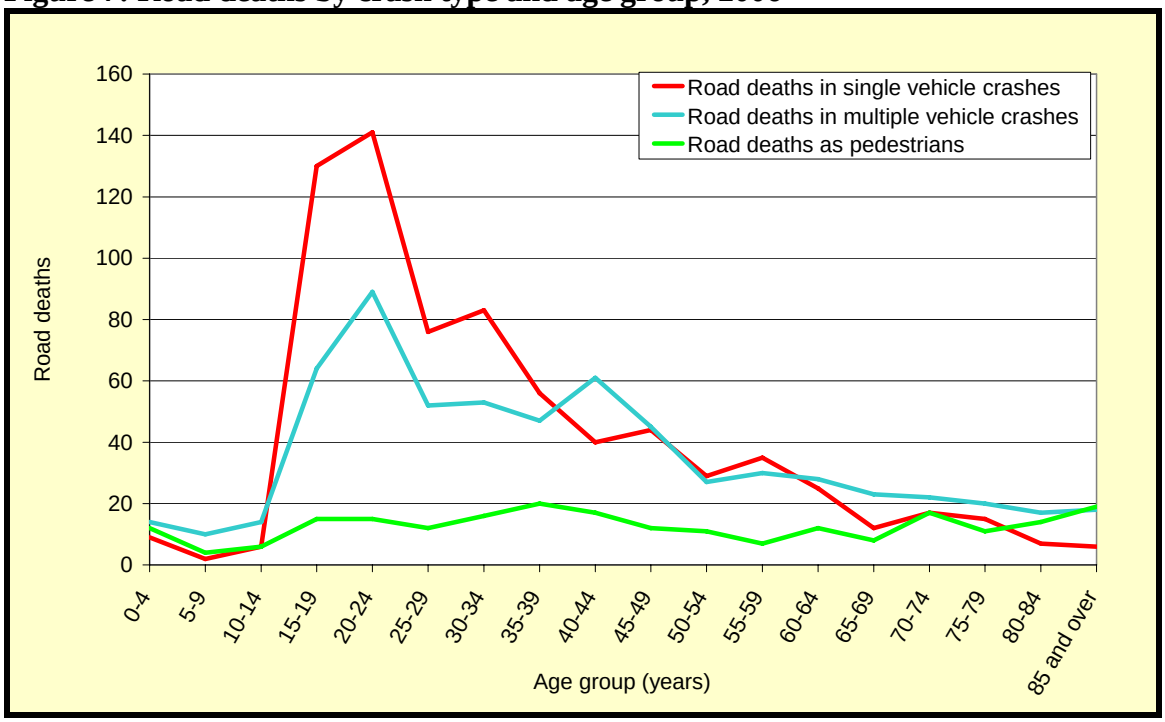


Figure 8: Road deaths by crash type, people 17-24 years old, 2006

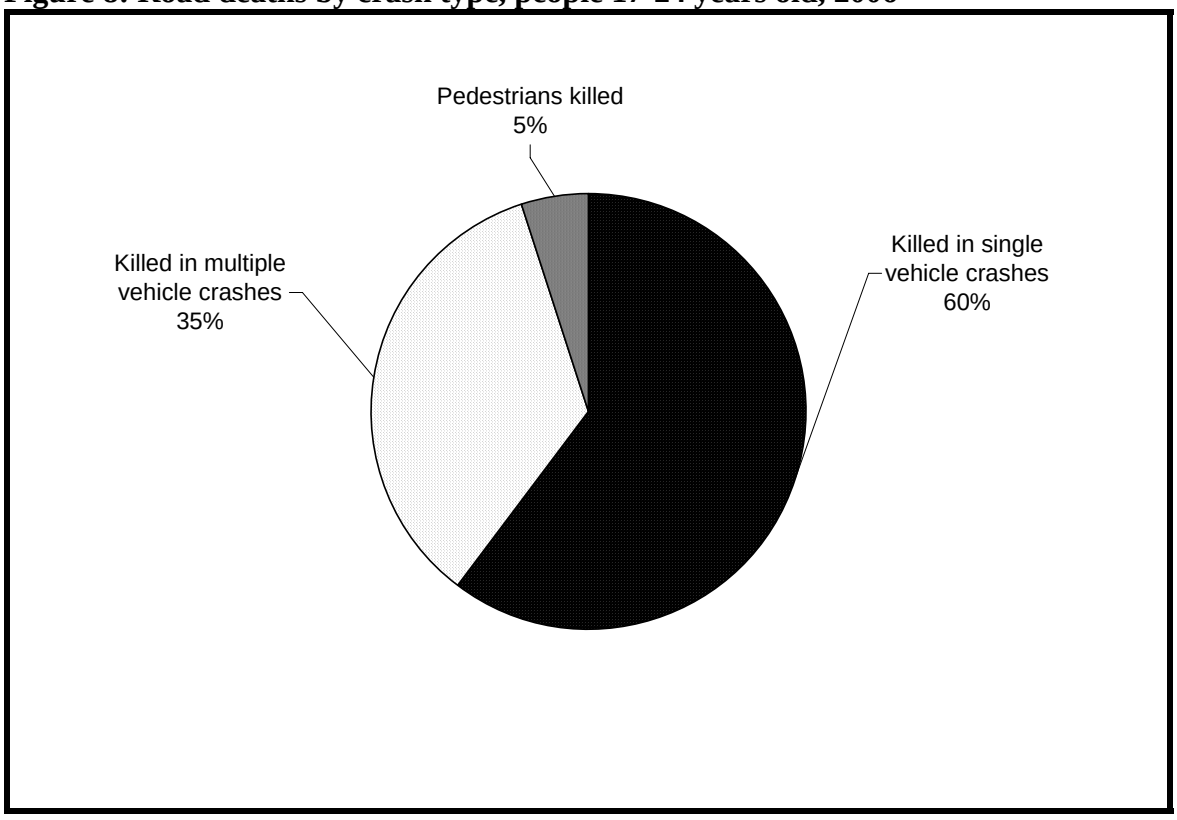
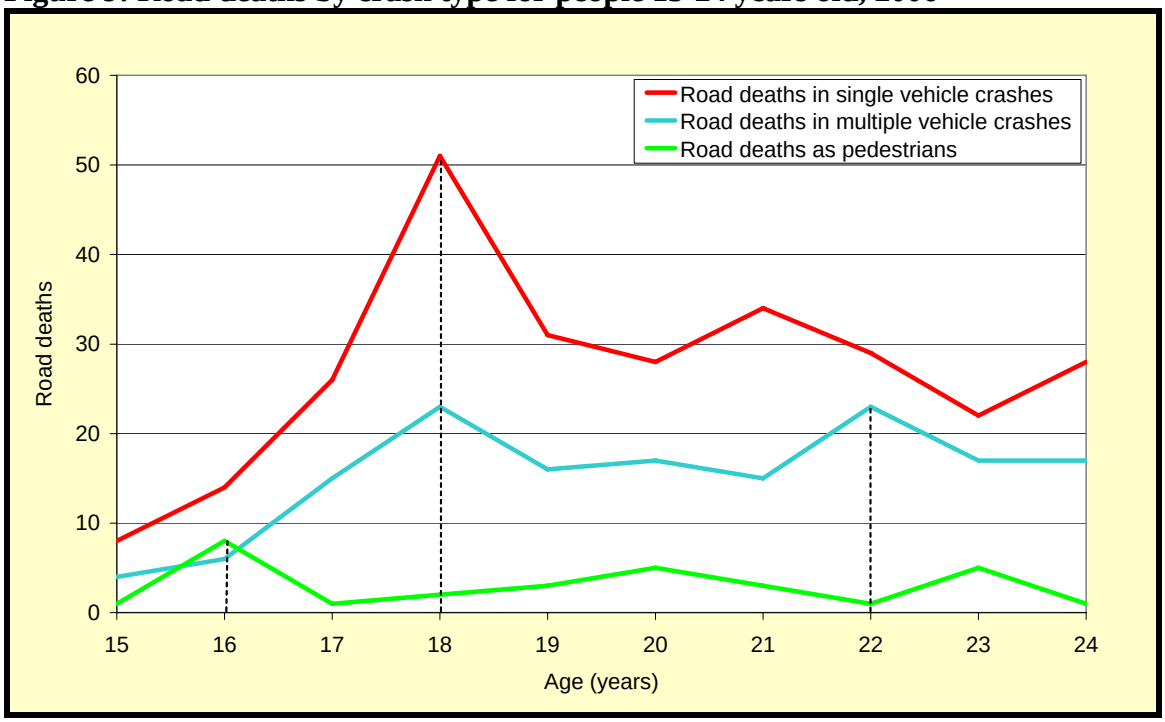


Figure 9 examines the younger age group in more detail and shows that in 2006 deaths of young pedestrians peaked at 16 years of age, deaths in single-vehicle crashes at 18 and in multiple vehicle crashes at both 18 and 22.

Figure 9: Road deaths by crash type for people 15-24 years old, 2006



The over-representation of young people in road crashes is certainly not unique to Australia. Table 3 shows the road death rates for selected age groups compared with the total population, for a range of countries.

Table 3: International road death rates per 100,000 people, selected age groups and total population, 2005

	15-17 age group	18-20 age group	21-24 age group	25-64 age group	65 and older age group	**Total population death rate per 100 000 people**
Netherlands	5.6	11.0	7.5	4.2	8.2	**4.6**
Norway	8.9	12.8	10.9	4.7	6.2	**4.9**
Sweden	5.3	8.7	9.3	5.0	6.7	**4.9**
Switzerland	6.5	15.8	10.2	4.6	9.2	**5.5**
United Kingdom	9.3	15.0	11.0	5.2	6.4	**5.5**
Denmark	10.7	16.2	10.2	5.9	8.6	**6.1**
Japan	4.0	9.3	7.1	4.8	13.4	**6.2**
Israel	5.8	11.1	9.5	7.0	12.1	**6.5**
Germany	7.7	17.9	14.5	6.0	7.6	**6.5**
Finland	8.4	15.0	9.0	7.0	11.0	**7.2**
Australia	**8.6**	**19.9**	**15.7**	**8.0**	**10.0**	***8.0***
France	11.1	22.8	21.7	8.5	10.0	**8.8**
Canada	11.1	20.9	16.9	8.8	11.5	**9.1**
Austria	16.4	24.6	15.8	8.9	11.3	**9.3**
New Zealand	23.0	28.1	17.4	8.5	11.3	**9.9**
Spain	10.2	20.1	19.1	10.8	9.8	**10.2**
Belgium	8.3	22.3	22.0	11.3	10.3	**10.4**
Portugal	10.0	24.7	22.6	12.5	12.3	**11.8**
Czech Republic	8.0	21.5	23.7	13.3	14.1	**12.6**
South Korea	6.2	8.4	8.8	13.8	38.8	**13.2**
Poland	8.8	19.6	21.4	15.1	18.2	**14.3**
United States of America	17.7	30.9	27.4	15.3	17.7	**14.7**
Greece	10.8	28.5	33.9	14.9	16.0	**15.0**

Data Sources

Data for these figures and tables were drawn from:

- ATSB Monthly Fatality Crash Database
- International Road Traffic and Accident Database (IRTAD)
- Harrison J, & Berry JG. (2007) *Serious injury due to land transport accidents, Australia, 2003-04*, Australian Institute of Health and Welfare. <http://www.nisu.flinders.edu.au/pubs/reports/2007/injcat107.php>

Underlying risks and major factors contributing to such crashes

During 2005 and 2006 the ATSB participated in an international project coordinated by the Joint Transport Research Centre (OECD and ECMT) to identify the key elements of young driver risk, the factors behind it, and countermeasures to address it. The report 'Young Drivers: The Road to Safety', provides policy advice intended to assist governments and other parties in taking steps to reduce young driver risk and the associated human and economic costs.

> *The high levels of young driver risk result principally from factors of inexperience, age, and gender. This risk is aggravated by the circumstances under which many young people drive – young people, especially men, are over-represented in crashes at high speed, at night, with similarly aged passengers, involving alcohol, and often when not wearing seatbelts.*
>
> *The reasons why age, gender and experience combine so destructively in some young people on the road, and why some young people are more risk prone than others, are highly complex. They involve a myriad of interacting factors, including physiological and emotional development, personality, social norms, the role of youth in society, individuals' socio-economic circumstances, impairments to capabilities, the driving task itself, and the type of driving that young, novice drivers often engage in.*

The summary report is available for download from the Joint Transport Research Centre: <http://www.cemt.org/JTRC/WorkingGroups/YoungDrivers/index.htm>.
Among a wide range of conclusions the report notes the following:

- The important contribution to be made to young driver safety by improving overall road safety through effective legislation, enforcement and standards, particularly dealing with speed, alcohol, drugs and seatbelts;
- The importance of high levels of accompanied practice before licensing for solo driving;
- The value of graduated licensing (GDL) systems including various restrictions to reduce the typically very high exposure to risk immediately following licensing;
- The value of an initial probationary period with higher demerit points assigned for infractions or for non-compliance with licensing conditions;
- That the fundamental goals of the licensing system, including training and testing, should be to create drivers who are safe, as well as technically competent – novice drivers need to gain greater self-assessment skills and understanding of the factors behind risk;
- The potential for non-road-safety measures, such as the availability of public transport at reasonable cost and regulations regarding the availability of alcohol, to reduce young drivers' risk exposure;
- The need to engage the public on the basis of research-based evidence showing the costs and benefits of given countermeasures, and of inaction; and
- The need for strong political leadership to address the challenge of young driver risk, given that road safety measures are seldom popular prior to their implementation.

The efficacy of young driver education programmes

National and international reviews of research have consistently failed to show any significant desirable effect of existing education and training programmes on novice driver crash involvement. Some types of skills-based training may even worsen road safety outcomes, possibly due to adding to over-confidence and risk-taking behaviour.

However, there may yet be potential for education programmes to have a positive effect on safety outcomes if they are developed in a way that reflects current understanding of the novice driver problem and effective behaviour change principles. The Joint Transport Research Centre report cited above noted the potential benefits (as yet unproven) from approaches that assist novice drivers to develop greater self-assessment skills and a better understanding of the factors behind risk.

An ATSB report published in 2004, 'Development of novice driver education/development curriculum: Novice Driver Coaching Program' (CR 222), by Dr Ron Christie and Warren Harrison, detailed early development work on a novice driver education model. The report is available for download from the ATSB website: <http://www.atsb.gov.au/publications/2004/pdf/Edu_Nov_Dr.pdf>.

In developing the model programme, the authors noted a series of assumptions, stemming from their analysis of novice driver and education research, about what a novice programme should and should not do. These included:

- Target novice-driver behaviours or characteristics that are known to be related to crash involvement. Targeting other behaviours or characteristics might influence behavioural outcomes or attitudes, but is less likely to have an effect on crash involvement.

- Target behaviours and characteristics that are able to be manipulated using an intervention based on sound education and training methods. Some characteristics that appear to be related to crash involvement—such as driver personality—are not able to be changed using educational methods and would therefore make poor targets for the programme.

- Target these behaviours or characteristics in a way that does not have negative consequences for safety. The cognitive and behavioural skills that assist in safe driving develop naturally for drivers, with the consequence that the likelihood of crash involvement is remarkably low for experienced drivers. This natural development of safe skills could conceivably be hindered by a driver training programme.

- Use educational or training methods that are known to have an effect on the target behaviours and characteristics, and that are limited to methods of this type.

- Adopt an adult-learning approach to the development of novice driver participants—including the incorporation of coaching/mentoring.

- Target higher-order driving behaviour and not vehicle control per se.

Novice Driver Programme Trial

The Australian Government is partnering with the governments of NSW and Victoria and several private sector organisations (the Federal Chamber of Automotive Industries, Insurance Australia Group, and the RACV) in a research trial of a safety education programme for young drivers.

The programme is to be delivered to novices aged 17–21 years in NSW and 18–22 years in Victoria, when they obtain their first provisional car licence (reflecting the minimum licensing ages of 17 years in NSW and 18 years in Victoria).

The programme is to focus on providing young drivers with greater appreciation of the risks they face and their own limitations. The aim is to deliver an education programme to young novice drivers using an adult education approach, with a view to changing their on-road behaviour in such a way as to reduce their crash risk. The development of the structure and content of the education programme has been informed by relevant research in road safety, psychology, and health education.

It comprises four modules focusing on behavioural factors that lead to a higher level of crash involvement among novice drivers, and features best practice learning methods, including facilitated group discussion of safety issues and an on-road mentoring session. An early outline of the curriculum structure is attached for further information. Curriculum development has progressed since this outline was prepared and the work is not yet completed. The curriculum structure document therefore does not represent the final curriculum and should be treated as indicative only.

The trial will be conducted in NSW and Victoria. Approximately 7000 course participants, and a similar number of control group participants, will be required to complete the trial in each state. Allowing for drop-outs, this means initial recruitment levels of at least 28,000 young drivers in each state.

Twelve months of post-course crash data will feed into a rigorous evaluation of the safety effects of the programme, with the evaluation to be designed and conducted by a separate specialist organisation.

Recruitment of young novice drivers for the trial is to commence in 2008, with results expected to be available through staged reports commencing in 2009, with a final report in 2010.

NOVICE DRIVER PROGRAM TRIAL

CURRICULUM STRUCTURE

TABLE OF CONTENTS

1 BACKGROUND

Drivers in their first few years of driving have a much higher risk of crash involvement and injury than experienced drivers. This phenomenon has been reported in many countries and has led road safety bodies to target novice driver crash involvement as a key public health and road safety issue.

Disappointingly, education and training programs have not been shown to have a significant effect on novice driver crash involvement. However, there is ongoing interest in the possibility that such programs might have a positive effect on safety outcomes if developed in a way that reflects current understanding of the novice driver problem and effective behaviour change principles.

For this reason, a new education program for novice drivers will be developed and trialled in Victoria and New South Wales. The central aim of the program will be a reduction in crash risk, with a consequent focus on factors that are related to the higher level of crash involvement among novice drivers.

The education program will take the form of a group-discussion, self-assessment and coaching based program.

It is intended that the program will represent best practice as it is currently understood. The development of the structure and content of the education program must be informed by relevant research in road safety, psychology, and health education[1]. One consequence of this is that the proposed program cannot be a 'traditional' education or training program. As is noted later, there is no evidence that these are effective in a road safety context.

There are different theoretical approaches or rationales that could be used as the basis for the education program. A variety of models of behaviour change and learning mechanisms exist, including associative learning and avoidance learning theory, social learning theory, the theory of planned behaviour, and cognitive approaches which encompass a wide range of concepts, including 'self-management' and 'self-monitoring'.

The curriculum developer is expected to select and make use of a sound approach that has empirical support and is consistent with the broader road safety, health education, and behaviour-change literature.

Working in collaboration with the Steering Committee, the successful curriculum developer will provide a detailed justification outlining the research, evidence-base, assumptions, advantages and disadvantages of a proposed rationale and approach(es) to be adopted. The curriculum developer should consider and document a range of alternative and/or complementary approaches for effective behaviour change based on supporting evidence, including the general example outlined in the last section of this document.

The high level of crash involvement of novice drivers is a complex phenomenon. It is not reasonable to attempt to influence all of the factors associated with novice driver crashes in an education program as many of them increase crash risk indirectly and some (like personality

[1] Relevant reference material has been cited in footnotes throughout this document. It is expected that the curriculum developer will make use of this and other material as necessary to inform the development of content and support material.

factors) are unlikely to be influenced through education[2]. The novice driver education program will therefore have a strong focus on the subset of key factors that are thought to have a central role in crash involvement and that may be amenable to change through an education program using behaviour change principles.

This approach raises significant challenges for curriculum development. In particular, it is necessary to ensure that the objectives of the program are defined by current understanding of young driver behaviour and effective behaviour change. The key objectives of the program are not increased knowledge or changes in attitudes – they are behavioural. Achieving behavioural change and a resulting improvement in safety outcomes requires a program philosophy or approach that makes use of behaviour change principles. Adult learning principles[3] will be central to the effective delivery of the program in a way that meets the central behaviour-change objective.

An additional issue is the developmental context in which the program is being delivered, where participants will be young adults with a broad range of life experiences, educational achievements, cognitive skills, and maturity. Participants will also bring a range of attitudes towards road safety. The program will make use of these differing experiences and attitudes in a facilitated group discussion format, but the curriculum developer needs to be aware that activities that might be effective in an adult-learning environment may be ineffective for many young drivers. It is also important to ensure that the different experiences, attitudes, backgrounds, personalities, and levels of maturity that participants bring to the program are not an impediment to them achieving positive road safety outcomes.

Some progress has already been made. The development of the proposed program structure and guiding principles is drawn from a range of information and activities including:

- information from a report prepared for the ATSB;
- a workshop involving young driver experts;
- some additional background work drawing on behaviour change principles, programs targeting adolescent health behaviours, and a Finnish young driver program.

The successful tenderer will be provided with copies of relevant background documents.

This document provides background information concerning:

- crash involvement of novice drivers;
- target behaviours;
- proposed structure for the program; and
- an example of a possible rationale and approach to be considered by the curriculum developer among a range of other complementary or alternative approaches based on supporting evidence.

---

[2] A recent short review of the factors associated with young driver crash involvement is in Smart et al. (2005) *In the Driver's Seat: Understanding Young Adults' Driving Behaviour*; Melbourne: Australian Institute of Family Studies.
The importance of lifestyle factors has been detailed by Bina et al. (2006) 'Risky lifestyles and driving in adolescents', *Accident Analysis and Prevention*, 38, 472-481. Clarke et al have a paper in press (*Accident Analysis and Prevention*) that discusses recent evidence concerning factors associated with heightened crash risk and the reduction of this risk with experience.

[3] Refer to work by Malcolm Knowles – links at http://staff.fanshawec.on.ca/TGedies/andragogy.htm

2 AIMS OF THE EDUCATION PROGRAM

The program's focus is on the high crash risk of young drivers. It has the following specific aims:

- *A reduction in the number and/or severity of crashes.* Meeting this aim will be a significant challenge as there is little research evidence available that supports the effectiveness of education programs in road safety[4]. Support for the implementation of a new driver education program beyond this trial is unlikely unless the program has clear beneficial effects on the safety of young drivers, so it is essential that the program aims to reduce crash involvement[5].

- *An improvement in safe driving behaviour among novice drivers.* A reduction in crash involvement or severity will only occur if there is an improvement in safety-related behaviours among novice drivers. The focus of the program will therefore be behavioural – with the curriculum content directed towards achieving positive changes in driving behaviour.

- *Increased awareness by novice drivers of the risk factors that contribute to their high crash risks.* Novice drivers can modify their risk of crash involvement by making decisions that affect their exposure to risk[6]. The program will therefore focus on social decision making and associated motivational factors that lead to decisions to drive in situations where there is a higher risk of crash involvement for novice drivers.

The central goal of the program, therefore, is generating sustained changes in the behaviour of novice drivers of a kind that will substantially reduce their crash risk, particularly during the first year of driving when the risks are highest.

Achieving this goal requires that the program's structure and content be tightly focused on its behavioural aims and that they be closely informed by relevant research and behaviour-change principles. It is essential that the program focuses on a small number of behavioural targets and a well-developed behaviour change foundation as there is limited time available to influence participants. The program will also need to compete against the broad range of factors that raise the crash risk of novice drivers.

The program should not aim to change values, attitudes, or personality traits. Although there is a small correlation between them and crash involvement, psychological research indicates that relatively stable factors like these are difficult to change, especially in a short program[7].

---

[4] Recent Australian discussions of this issue can be found in Christie and Harrison (2003) *Driver Training and Education Programs of the Future*, Melbourne: RACV, and in Harrison (2003) *Report on Review of Novice Driver Road Safety Programs*, Sydney: NRMA. A recent Cochrane review of post-licence driver education by Ker, Roberts, Collier, Renton & Bunn (2003) also found no benefits from a meta-analysis of 24 trials of driver education.

[5] Such programs would involve a large cost to the community. A program in Finland, which has a comparable number of novice drivers to Victoria, costs the community around $30–$40 million each year. Hence, evidence of a clear benefit is an important consideration in determining whether such a program is recommended or required of novice drivers. Adoption of ineffective programs can lead to the loss of opportunities to implement effective programs.

[6] Clarke et al. (in press – *Accident Analysis and Prevention*), for example, report that night-time crash involvement among young drivers appears to relate to *how* they use the roads at night.

[7] For example, a review and an empirical study concerning the resistance of optimism bias to change can be found in Weinstein and Klein (1995) 'Resistance of Personal Risk Perceptions to Debiasing Interventions',

3 INFORMATION ABOUT THE TRIAL

The program is being trialled to assess its effect on crash involvement and severity. Development of the program content will occur in parallel with the development of the evaluation method and will be informed by two pilot tests. It is expected that the evaluation and curriculum-development teams will need to cooperate to ensure that the aims of the trial are met.

The trial will be conducted in New South Wales and Victoria. In each state it is planned that 7,000 newly licensed drivers will complete the program and provide follow-up data to assess crash involvement in the twelve months following the program. Another 7,000 newly licensed drivers will act as a control group in each state; this group will not participate in the program but is also followed-up up for 12 months. Participants will be randomly assigned to the program group or the control group. The crash involvement of the two groups will be compared over the 12-month follow-up period to assess the effect of the program. To allow for drop-out rates, it is expected that up to 26,000 novice drivers will need to be recruited to participate in the trial in each state.

The aims of the trial are different to (and broader than) the aims of the program. While the program is being developed with a specific crash-reduction goal, the trial will be evaluated by an independent evaluation team and has the following aims:

Primary Aim

- *Assessment of the effect of the program on the self-reported crash involvement of participants*. The central aim of the program is a reduction in the number and/or severity of crashes among novice drivers. The central aim of the trial is assessing the effect of the program on crash involvement and severity. Meeting this aim relies on the use of an experimental research design – where the crash involvement of participants randomly assigned to the program group and the control group is compared – and the use of scientifically acceptable statistical standards. Given the research evidence concerning driver education programs, the trial will test both for a reduction and an increase in crash involvement.

Secondary Aims

- *Assessment of the effect of the program on self-reported safe driving behaviour*[8]. The second aim of the program is an increase in safety-related behaviours among participants. The trial will attempt to assess any change in self-reported safety-related behaviours in the program group compared to the control group.

- *Assessment of the effect of the program on participants' awareness of factors that influence their risk of crash involvement*[8]. This reflects the third aim of the program and will be assessed using measures to compare the program and control groups during the follow-up period of the trial.

Health Psychology, 14, 132-140, and Weinstein et al. (2004) 'Colon Cancer: Risk Perceptions and Risk Communication', *Journal of Health Communication*, 9, 53–65.

[8] The importance of using a process-based evaluation to complement an outcome-based evaluation is outlined in Watson (2003) 'Research priorities in driver training: bridging the gap between research and practice', *2003 Road Safety Research, Policing and Education Conference – From Research to Action: Conference Proceedings*, pp 571-575, Sydney: NSW Roads and Traffic Authority.

Tertiary Aims

The trial has some additional aims that go beyond the specific aims of the program itself and reflect, in part, the need to consider the practical issues associated with implementing a large-scale education program across a state or nationwide. These include the following:

- *The development of a novice driver curriculum specifically designed to improve the safe driving behaviour (including through the reduction in high risk exposure) of novice Australian drivers.* Development of the education program would not be possible without the commitment to the current trial. It is expected that the trial will further inform improvements to the curriculum.

- *Increasing the awareness in the general community of the need to improve safe driving behaviours as a contribution to reducing road deaths, serious injuries and damage to property*. The trial will be publicised widely and it is expected that one consequence of this will be an increase in broad community awareness of road safety issues as they relate to novice drivers. This will be assessed as part of the evaluation of the marketing campaign planned for the trial.

- *Determination of the willingness of novice drivers to participate in a program of this type*. If the program does have a positive effect on safety, its success in a broader implementation will rely on achieving high levels of attendance by novice drivers. The trial will allow conclusions to be drawn about participation levels and drop-out rates.

- *Identification of the practical issues that would need to be resolved in order to implement a nationwide program for novice drivers*. It is expected that the trial will raise issues that will need to be considered in a wider implementation should the program be effective.

- *A significant addition to the research evidence and knowledge on novice drivers*. The trial is important internationally as it is currently the only large-scale evaluation of the effect of a novice driver education program on crash involvement using a sound research design. There is widespread interest in the outcomes of the trial, and it can be assumed that it will influence novice driver policy decisions in other jurisdictions.

As noted, the trial will be conducted independently. Ensuring that the program structure and content do not impede the successful completion of the trial will necessitate a high level of communication and cooperation between the evaluation team and the curriculum team.

4 INFORMATION ABOUT YOUNG DRIVERS

Novice Drivers

Novice drivers have a higher risk of crash involvement than other drivers[9]. Research suggests that there are many factors that contribute to this high level of risk, including the following:

- *Inexperience*. There is considerable evidence across different areas of skill development and within road safety to support the suggestion that experience is a key factor in skill acquisition and safety[10]. The rapid reduction in crash risk over the first 6–12 months of driving suggests that inexperience is particularly important as a causal factor. An education program cannot take the place of experience in skill acquisition, but it may encourage young drivers to make decisions about driving that take their low level of experience into account, and may influence factors other than skill acquisition that influence crash risk.

  Although age is a contributor to crash risk (with younger drivers having a higher risk than older drivers), inexperience is an important factor for novice drivers of all ages and is widely believed to be more important than age in jurisdictions where the minimum licensing age is 17 years or above[11]. Experience is believed to help a driver to better 'read' the road through a number of effects such as increased familiarity, a lower mental workload, a higher degree of automaticity, better ability to handle multiple tasks and ready-made solutions based on better developed 'mental rules'. These effects have been explained in the following way:

  - An improvement in automaticity and attentional capacity. Experience allows some driving tasks to become automated. Tasks such as gear changing, lane keeping, speed control, and scanning are thought to become increasingly automated with experience. This increased automaticity has the effect of freeing up some of the driver's limited attentional capacity for other safety-related tasks such as scanning for hazards.

  - A more accurate mental representation of the driving environment and task. Drivers rely on their mental representation or mental map of driving to guide their decision making and their scanning for potential hazards. This mental representation develops with experience, helping to improve the driver's ability to detect and respond to potential hazards.

  These effects of driving experience do not appear to depend on any conscious processes on the part of the driver and are unlikely to respond to an education program.

- *Speeding and traffic offending*. There is research evidence suggesting that young drivers are more likely to drive faster than experienced drivers, and that they are less likely to

[9] General information about the nature of young driver crash risk can be obtained from sources such as the background material to the graduated licensing system changes in Victoria available from www.arrivealive.vic.gov , and information published in New South Wales by the RTA available from www.rta.nsw.gov.au

[10] A longitudinal study [Groeger (2004) *Differential Effects of Formal and Informal Driver Training*, London: Department for Transport (DfT)] of learner drivers showed that driving skill or aptitude improved as a power function of the amount of experience accrued. International research evidence is consistent in its support for the role of real-world driving experience in reducing crash risk.

[11] See a review of relevant literature in Gregersen and Bjurulf (1996) 'Young novice drivers: Towards a model of their accident involvement', *Accident Analysis and Prevention*, 26, 297-303.

adjust their speed in the same way as experienced drivers. Some young drivers rapidly accumulate demerit points after licensing. Those young drivers who commit traffic offences, such as speeding, have an increased risk of subsequent crash involvement of up to 65 per cent[12]. Speed-related behaviours are important because inappropriate speed choices have the dual effect of increasing the risk of a collision and increasing its severity. For this reason, speed-related behaviours are an important target of the program.

- *Driving in high-risk or complex situations*. Driving at night or with peer passengers in the car appears to be associated with a higher risk of crash involvement among novice drivers, with novices in these situations highly over-represented in crash statistics[13]. A key focus for the program will be reducing the exposure of novice drivers to risky driving situations by influencing their decision making about driving and transportation methods.

- *Impairment from alcohol, drugs, and fatigue*. These are lifestyle issues for young drivers that can result in an increase in crash risk[14]. They are most likely best considered as issues relating to decision making about driving and other transport options. These could be included in an education program alongside night-time driving and driving with peer-passengers as decision-making issues relating to exposure to risk.

- *Restraint non-use*. Restraint usage rates in Australia are generally high, although there is some evidence that they are slightly lower for novices and their peer-passengers. There is, however, evidence that restraint use is a habitual behaviour that is cued by specific elements of the driving situation[15].

- *Distractions*. There is evidence that novice drivers are more affected by distractions than are experienced drivers[16]. Key distractions for novice drivers include CD players and entertainment technology in the car, and mobile telephones.

- *Immaturity and developmental factors*. Novice drivers are also generally young drivers, and research shows that youthful age is a factor in the relatively high crash risk of novice drivers. This most likely reflects developmental factors and the relatively high levels of risk-taking behaviour associated with late adolescence[17]. These factors are not easily influenced in an education program, but will need to be taken into account in developing the program.

- *Risk awareness*. Young drivers are unlikely to be fully aware of the risks associated with their own inexperience or the risks associated with high-risk behaviours such as speeding or following too closely. This lack of awareness is an important issue for the education program as it may result in some resistance to the key message that some of the participants' own driving behaviours are associated with a heightened risk of crashing.

---

[12] See Forsyth et al. (1995) *Cohort Study of Learner and Novice Drivers: Part 3, Accidents, Offences, and Driving Experience in the First Three Years of Driving*, Research Report 111, Crowthorne, UK: Transport Research Laboratory.

[13] Refer to footnote 9.

[14] Fatigue or driving when tired is a critical lifestyle issue for young drivers – see the literature review and Australian research study reported by RACV in Harrison (2006) *Fatigue and Young Drivers*, Report 05/04. Noble Park, Vic.: RACV. Alcohol continues to be a problem, but less so for very young novices, and drugs are an increasing problem for this age group.

[15] MUARC reached this conclusion in a study and literature review in 2001 in its report number 170.

[16] This was shown in relation to telephone use by Shinar et al. (2005) 'Effects of age and task demands on interference from a phone task while driving', *Accident Analysis and Prevention*, 37, 315-326.

[17] See detailed results on personal and developmental factors associated with safe and unsafe driving reported by Smart et al. (2005) *In the Driver's Seat: Understanding Young Adults' Driving Behaviour*, Melbourne: Australian Institute of Family Studies.

- *Poor calibration*. Self-confidence develops quickly for young drivers, with most learner drivers having high levels of self-confidence soon after they first start driving[18]. The self-confidence of novice drivers may not be matched by their level of driving aptitude and may be a factor that causes them to engage in risky behaviours. There is little evidence to suggest that young people have a stronger sense of optimism than older people, or that they have stronger feelings of invulnerability[19]. Optimism bias appears to be present across age groups and is almost certainly a relatively-stable personality characteristic that is difficult to shift[20].

  Self confidence develops quickly in all areas of skill development, but is a complex phenomenon that in part reflects recognition of actual improvements in skill and is therefore realistic, and in part reflects an underestimation of task difficulty or complexity with limited exposure. It is likely to be difficult to influence self-confidence and calibration in an educational setting as these reflect the experiences of novice drivers – where the ability to control the vehicle improves quickly, and where driving outcomes have generally been safe regardless of their actual level of skill or aptitude.

- *Driving older, less crash-worthy cars*. Novice drivers are more likely to drive less crash-worthy cars, but this is likely to be the result of insufficient money to afford a better car and is not easily influenced in an education program.

- *Personal factors such as motivation, family and social background, and personality.*[21] These are not easily influenced in an education program. It will be necessary to incorporate motivational methods into the program to encourage participants to take up behaviour-change options that lead to safer outcomes, but it would be unrealistic to expect a short educational program to have an effect on broader personality or motivational factors that lead to unsafe driving.

The combined effect of these factors is an increased crash risk across crash types and situations, but there is also strong evidence that young drivers have particular problems with specific types of crashes. These crashes are thought to involve one or more of poor speed choice/control, close following, poor gap selection, and limited hazard perception skills.

These behaviours have been documented by a number of researchers[22]. Safety margins to manage these specific risky behaviours have the potential to reduce crashes. The over-representation of novice drivers in the specific crash types of concern is shown in the following table for drivers involved in casualty crashes in Victoria in the period 1996-2001. It is important that the novice driver education program focuses on behaviours associated with these crash types.

[18] Australian evidence suggests that learner drivers become as confident as they ever become with less than 12 hours of on-road experience, despite their likely lack of driving aptitude or skill at that stage – see Harrison (2004) 'Investigation of the driving experience of a sample of Victorian learner drivers', *Accident Analysis and Prevention*, 36, 885-991.

[19] Quadrel et al. (1993, 'Adolescent (In)vulnerability', *American Psychologist*, 48, 102-116), for example, reported that adolescents do not generally consider themselves to be less vulnerable to involvement in a crash than other people, except in comparing themselves to their parents where there was a small 'invulnerability' bias.

[20] For a discussion of this issue, see the review by Weinstein and Klein (1995) 'Resistance of personal risk perceptions to debiasing interventions, Health Psychology, 14, 132-140.

[21] See the discussion in Ulleberg & Rundmo (2003) 'Personality, attitudes and risk perception as predictors of risky driving behaviour among young drivers', Safety Science, 41, 427-443.

[22] McKenna et al. (1998) *Male and Female Drivers: How Different Are They?*, AA Foundation for Road Safety.

Type of crash involvement	Driving experience				Relative frequency for first year drivers
	First year		15+ years		
	Count	%	Count	%	
CRASHES LIKELY TO BE SPEED RELATED:					
Single-vehicle off path	2063	20.8	2910	7.1	**2.92**
Single-vehicle on path	203	2.0	639	1.6	**1.31**
Other possible high speed single-vehicle	11	0.1	23	0.1	**1.97**
Other non-speed single-vehicle	46	0.5	178	0.4	1.06
Sub-total all single vehicle crashes	2323	23.4	3750	9.2	2.55
Rear driver in rear-end crash (TOO CLOSE)	1274	12.9	4157	10.2	**1.26**
Gap selection	1823	18.4	4748	11.7	**1.58**
Any other crash involvement	4487	45.3	28081	68.9	0.66
Total	9907	100.0	40736	100.0	1.00

The last column (shaded) in the table shows the level of over-representation of drivers in their first year of solo driving experience compared to drivers with 15 years or more driving experience for specific crash types defined according to information collected immediately after the crash[23]. The figures in the last column show that novice drivers are more likely to be involved in:

- speed-related crashes[24] (the first three figures are for single-vehicle crashes thought likely to involve speed);
- rear-end crashes as the following driver (almost certainly including following too closely as a contributing factor); and
- crashes thought to involve poor gap selection (where the driver was turning at an intersection and collided with another car).

Fifty-five percent of crashes involving young drivers appear to involve speed, following too closely, or poor gap selection – compared to about 30% of crashes involving experienced drivers. Given that they also contribute significantly to the crash involvement of first-year drivers, the education program would be best to focus on the behaviours associated with these crash types.

[23] The effects of alcohol on crash involvement have been removed in preparing this table, to ensure that the data reflect the crash types that are problems for young drivers in general. Drink driving is not suggested as a central focus of the education program because there are many other road safety measures that address this problem.

[24] While other factors such as distraction or tiredness may also contribute to single-vehicle crashes, the role of speed in single-vehicle crashes is well accepted. In addition, there is also some evidence to suggest that driving too fast or poor speed choice continues to be a problem for young drivers beyond the first year of driving, making it a key issue to be addressed.

The Road Safety Context of the Education Program

The education program will be developed and trialled in a broader road safety context in New South Wales and Victoria where there are new and ongoing initiatives targeting young and novice drivers:

- Both states have graduated driver licensing systems. New South Wales has a two-stage provisional licence for novice drivers with a number of restrictions and a requirement to pass computer-based tests to move through the system. Victoria currently has a single-stage probationary licence but will be introducing a two-stage probationary licence for young novice drivers during the planned project. This will be accompanied by an extensive communications program. The licensing requirements in both states include a zero blood alcohol requirement for new drivers.

- New South Wales and Victoria have intensive traffic enforcement programs targeting safety-related driving offences and wide-ranging communications programs, some of which target novice drivers.

- Learner drivers in both states are encouraged to accrue relatively high levels of driving experience. There is a minimum experience requirement for learner drivers in New South Wales, where they are required to accrue at least 50 hours of experience before attending their licence test. In Victoria it is thought that learners currently accrue an average of 80–90 hours of experience, and the changes to the licensing system that will be introduced in mid-2007 will include a requirement for a minimum of 120 hours of experience.

The curriculum for the education program will need to take the current and changing road safety context into account. It is expected that it will be possible to link some content of the curriculum to current novice-driver requirements and that this will help improve the relevance of the curriculum for participants.

Driver Education and Training

Research concerning driver education programs for novice drivers is generally unsupportive. In particular:

- Driver training programs that focus on vehicle-handling skills may cause an increase in crash risk that is generally believed to result from an increase in self-confidence without any significant improvement in actual driving aptitude or safety.

- There is consistent evidence that defensive driving courses do not have a beneficial effect on safety outcomes for novice drivers[25]. This most likely reflects the importance of unconscious cognitive processes in driving, their reliance on experience for their application to driving, and their resistance to manipulation through education or training methods as these tend to work at a conscious level.

- Despite its theoretical attractiveness, there is no available research evidence supporting driver education approaches that rely on generating self-awareness, self-management[26],

[25] Refer to footnote 4 for relevant reviews.

[26] Self management is a concept derived from two sources – the medical literature where it refers to patients taking increasing responsibility for managing the day to day demands of chronic diseases like diabetes, and the classroom-education and clinical psychology literature where it refers to programs primarily derived from the principles of cognitive behaviour therapy where clients are taught to recognise cues that signal an inappropriate behaviour on their part and then to modify that behaviour. Some of these programs use

or self-monitoring. Although it is yet to be tested in the driving domain, there is evidence from other areas of education, that the development of self-monitoring skills can enhance learning outcomes[27].

- There is no available evidence that education programs based on general insight and knowledge about crashes result in road safety benefits. Some studies based on an insight approach could not demonstrate significant changes in safety-related behaviours[28].

Although there is limited evidence supporting driver education and training for novice drivers, one study appeared to show some improvements in crash outcomes after a novice-driver education program that appeared to focus on behavioural insight – insight about the increased risk of a crash associated with specific unsafe behaviours, such as speeding and following too closely. Despite some earlier criticism of the evaluation method used in this Finnish study, recent analyses suggest that it resulted in small, statistically significant reductions in crash involvement among novice drivers.[29]

This Finnish program has served as a general guide to the development of the current program, although there are some differences that reflect the input of members of the Steering Committee.

---

externally-applied consequences to motivate behaviour change, but can also make use of self-reinforcement. Self-management has empirical support in clinical and medical research – but this success may reflect the behavioural basis of the approach and the use of rewards rather than the effect of some higher-level insight about the behaviour and its less-tangible, long-term or rare consequences. It may be appropriate to include self-management approaches in the novice driver curriculum, but these would need to be based on behavioural principles rather than simply increasing self-awareness and knowledge. The ability of young drivers to adopt higher-level awareness when their driving is not yet automated and considerable mental resources are devoted to the basic driving task needs to be considered, as does the general cognitive ability of the broader population of young drivers.

[27] Refer to definition by Bailey: "Self-monitoring is a cyclic process in which learners monitor the effectiveness of their learning methods and strategies, and respond to this feedback in a variety of ways. It covers self-regulating, self-instruction and self-evaluation during learning activities, and therefore contains both higher-order cognitive and motivational components. There is a growing body of research-based evidence linking learner self-monitoring with performance success." (p. 131) in Bailey, T, 'Novice driver self monitoring' (pp.129- 140), *Developing Safer Drivers and Riders Conference Proceedings*, 22–23 July, 2002, Travelsafe Committee of the Queensland Parliament and the Australian College of Road Safety.

[28] See Engstrom et al. (2003) *Young Novice Drivers, Driver Education, and Training*, Report 491A, Linkoping: VTI, for an initial review of relevant literature that informed the VTI insight approach, and then Nolen et al. (2002) *PILOT: Further Education of Young Drivers*, Linkoping: VTI, for an example of the lack of effect on safety-related behaviours.

[29] See two European reports concerning the Finnish approach, its results, and its expansion into trials across Europe – the final reports for Project BASIC and Project NovEv – both available for download from www.cieca.be

5 GUIDING PRINCIPLES

While there is little evidence supporting the use of education programs in the driver behaviour area, there are some positive findings in the adolescent health area that provide some guidance for program development. Successful program characteristics include the following[30]:

- a focus on a few well-defined behavioural goals;
- a strong theoretical background that has informed program development[31];
- provision of easily understood information and inclusion of activities that make the information personally relevant to participants (e.g. experimental and problem solving activities such as role plays, brainstorming, small group discussions);
- inclusion of activities that address social and/or media influences on target high-risk behaviours;
- reinforcement of appropriate values and norms[31, 32];
- use of facilitated group discussion formats, sometimes with peer facilitators[33];
- inclusion, if appropriate, of a self-assessment component with personalised feedback[31, 34];

[30] Refer to various chapters in Millstein et al. (1993), *Promoting the Health of Adolescents*, Oxford University Press); Hingson & Howland, (1993) in *Promoting the Health of Adolescents*, Oxford University Press); Flora & Thoreson (1988) 'Reducing the risk of AIDS in adolescents', *American Psychologist*, 11, 965-970; Kirby D, Short L, Collins J et al (1994) 'School based programs to reduce sexual risk behaviours: a review of effectiveness', *Public Health Reports*, 109, 339-360; Svenson L., Carmel S. and Varnhagen C. (1997), 'A review of the knowledge, attitudes and behaviours of university students concerning HIV/AIDS', *Health Promotion International*, 12(1), 61-88; Perry C.L., Kelder S.H., Murray D.M. and Klepp K. (1992), 'Communitywide smoking prevention: long-term outcomes of the Minnesota Heart Health Program of the Class of 89 study', *American Journal of Public Health*, 82, 1210-1216; Mulvihill C (1996), 'AIDS education for college students: review and proposal for a research-based curriculum', *AIDS Education and Prevention*, 8(1), 11-25; Watson (2003), 'Research priorities in driver training: bridging the gap between research and practice', *2003 Road Safety Research, Policing and Education Conference – From Research to Action: Conference Proceedings*, pp 571-575, Sydney: NSW Roads and Traffic Authority.

[31] Watson (2003), 'Research priorities in driver training: bridging the gap between research and practice', *2003 Road Safety Research, Policing and Education Conference – From Research to Action: Conference Proceedings*, pp 571-575, Sydney: NSW Roads and Traffic Authority.

[32] Cook, Anson & Walchli (1993) in Millstein et al. (1993), *Promoting the Health of Adolescents*, Oxford University Press).

[33] Hingson & Howland, (1993) in *Promoting the Health of Adolescents*, Oxford University Press. In the context of experienced fleet drivers and bus drivers, both Gregersen et al 1996 and Misumi, 1978, 1982 have reported group accident reductions following group discussions. Refer Gregersen, Brehmer & Moren (1996), *Road Safety Improvement in Large Companies: An Experimental Comparison of Different Measures*; Misumi (1978) *The Effects of Organisational Climate Variables, Particularly Leadership Variables and Group Decisions on Accident Prevention*, Munich: Paper presented at the 19th International Congress of Applied Psychology; Misumi (1982) 'Action research on group decision making and organisation development', in *Social Psychology*, Hiebsch, Bradstatter, Kelley (Eds) Berlin: VEB Deutscher Verlag der Wissenschaften.

[34] See Neighbours et al. (2004) 'Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention', *Journal of Consulting and Clinical Psychology*, 72, 434-447.

- a focus on the development of interpersonal skills such as peer resistance skills and role plays[31];

- a focus on short-term or immediate effects and consequences of target behaviours;

- a strong focus on the use of concrete examples relevant to the personal experiences of participants. Knowledge is necessary for behaviour change, but is generally viewed as insufficient on its own. It is necessary to motivate participants to make use of new knowledge or skills, and personally relevant risk information is an effective motivator. Stimulating participants to remember prior unpleasant experiences of risky behaviour has been suggested as an important motivator for change in successful programs;

- strong threat appeals (shock tactics) are unlikely to influence most young people who discount the probability of the threat occurring to them and reduce the induced fear using maladaptive coping responses rather than reducing the danger[35];

- evidence from health-based media campaigns suggest that a certain degree of threat is required to motivate acceptance of messages, but the best outcomes are achieved when this approach is combined with information about relevant coping or avoidant strategies[36].

The education program's content should therefore be developed with a focus on a small number of key safety-related behaviours and a strong theoretical foundation. Any activities suggested for the program will need to be consistent with the above points. It is expected that the curriculum content will be consistent with best practice and research, and with the material outlined in this paper.

It is also expected that the curriculum developer will draw on the following general program and learning principles derived from the broader safety, health-education, and psychological literature.

Program Principles

- *Research basis*: The program's structure and content should be directly informed by research evidence on the nature of driving, the difficulties experienced by novice drivers, and the crash experience of these drivers. Additionally, information on the failure of past interventions to achieve success in reducing the high crash rates experienced by young novice drivers should be a key factor in the design of the program. Research from the health-programs literature should also be used to guide decisions about the program's content as there are some important examples of successful behaviour-change programs in the health area.

- *A focus on behaviours and behavioural decision-making:* Although there are many potential factors that could be addressed in the program, the limited time available with participants necessitates a strong focus on a small number of key factors that have a

[35] Refer Elliott, B.J. (2005) *The Use of Threat (Fear) to Reduce Adolescent Risk Taking: A Literature Review*, Unpublished report prepared for VicRoads.

[36] Tay R. and Watson B. (2002) 'Changing driver's intentions and behaviours using public health campaigns', *Health Marketing Quarterly,* 19 (4), 55-68. Lewis I.M., Watson B. and Tay R. (in press), 'Examining the effectiveness of physical threats in road safety advertising: the role of the third-person effect, gender, and age', *Transportation Research, Part F: Traffic Psychology and Behaviour*. To varying degrees, both of these studies support the value utilising communication messages that combine threatening information with other information about relevant coping strategies (that can be enacted to reduce the threat). In addition, this issue (and the relevant empirical evidence) is discussed in these two papers.

direct relationship with crash involvement. The program needs to focus on a small number of key high-risk behaviours that are associated with specific crash problems for novice drivers (speed, following distance, gap selection, and the detection and avoidance of hazards) and the decision-making that puts novice drivers into driving situations that are associated with crash outcomes (such as driving at night, with peer passengers, and while tired). This targeting of a narrow set of key crash-related behaviours and decisions will ensure that the activities incorporated into the program have a clear focus.

- *A focus on increasing the effect of crash-reducing mechanisms:* There is little evidence that it is possible to suppress or influence the action of relatively stable psychological characteristics such as personality traits, attitudes, and values in a short program, and even less evidence that changing these will result in the desired change in safety-related behaviours. Instead, the program is more likely to be effective if the focus is on increasing the effect of mechanisms that may act to reduce the risk of crash involvement.

- *Harnessing experience:* The program should seek to identify and specifically harness the driving experience of the novice drivers themselves, both prior to and during the intervention. This use of participants' own experience will provide personally relevant discussion material concerning the consequences of participants' decisions while driving. Sharing personal experiences about the problems and challenges they have experienced as new solo drivers, as well as risky driving situations and associated behaviours will be an important source of learning for participants. It will also increase the relevance of the program for participants and would, therefore, be expected to improve retention through the program. In addition, both prior to and during the intervention, participants' personal experiences should be utilised as an opportunity to extend learning[37].

- *The novice driver problem, not the problem novice driver*: The program should attempt to address the issues facing all novice drivers, not just a few who may exacerbate their inexperience by undertaking additional deliberate risky behaviours. While there are some novice drivers who appear to have a higher risk of crash involvement than their peers, the focus of this program should be on broader issues that increase the crash risk for most novices. This focus will ensure that any benefits from the program are available to a broad cross-section of novices rather than just a small subset of higher-risk drivers.

- *Driving is complex*: The program should incorporate a general theme concerning the complexity of the driving task, particularly in high-risk situations. Novice drivers should be encouraged to take this complexity into account when making decisions that influence their exposure to risk.

- *Longer-term change*: Any positive changes resulting from this type of program can be short-lived. This reflects the ongoing effect of day-to-day driving experience on perceptions of risk and is difficult to control in a driver education program. It is hoped, however, that the program structure and learning methods used in the program will promote longer-term changes in behaviour.

[37] A variety of approaches should be considered. The concept of self-monitoring is a tool which could be used for this purpose, refer to Bailey (pp.129- 140), *Developing Safer Drivers and Riders Conference Proceedings*, 22–23 July, 2002, Travelsafe Committee of the Queensland Parliament and the Australian College of Road Safety.

Learning Principles

- *A focus on producing behaviour change:* The program's central goal is to change the behaviour of novice drivers in a way that leads to improvements in their safety. Changes in attitudes, beliefs, knowledge, and awareness are not critical to the program's success except insofar as they promote changes in behaviour. It is therefore essential that the program makes use of relevant theoretical frameworks and principles of behaviour change.

- *A focus on behavioural/social decision making:* The program should also aim to influence novice drivers' decision making in relation to risky driving situations – encouraging them to make decisions that limit their exposure to risk, whether that be associated with night-time driving, driving with passengers, or in relation to driving while tired. Behavioural decision making in situations like driving relies on accurate assessment of the situation, and on accurate assessment of the potential risks associated with high-frequency behaviours[38]. The program should incorporate a focus on assessment of the situations associated with higher risk among novice drivers, personal experiences, and encouraging safer driving decisions. The program should include a focus on the influence of peers on decision making and strategies for minimising negative aspects of that influence.

- *A focus on motivation:* Simply providing information about problem behaviours and suggesting alternative behaviours is unlikely to result in behaviour change. In the case of driving, there are many factors that motivate risky behaviour and these will continue to influence novice drivers outside the education program. Generating a change in behaviour requires a change in motivation. To increase the likelihood of the program's success, participants will need to recognise their personal need to change and be motivated to implement changes.

  Theory and research also suggest that adopting new skills and behaviour will occur only "if accompanied by a strong sense of motivation to perform them and by the individual's sense of self-efficacy to perform them in situations where the behaviours are required."[39]

  The program should therefore incorporate a range of opportunities for self assessment or self profiling as a motivational tool. There is evidence that effective self-assessment tools can motivate changes in some health-related behaviours among young people[40]. The program should generate this motivation for change through a self-assessment and personal feedback activity (initial draft material will be provided to the curriculum developer).

  The program should also incorporate group discussion activities to create motivation for change, identify safer behaviours or decisions which participants believe they can change, and facilitate and enhance participants' capacity to adopt behaviour changes to manage risk. For example, group discussion activities could focus on:

[38] Considerable research in the naturalistic decision making area supports this approach to encouraging better decision making by novice drivers. For a general overview of this area, see material in Zsambok and Klein (1997) *Naturalistic Decision Making*, Mahwah: Erlbaum.
[39] Bandura (1992), cited in Cook, Anson & Walchli in Millstein et al. (1993) *Promoting the Health of Adolescents*, Oxford University Press.
[40] See White et al (2006) 'Evaluating two brief substance-use interventions for mandated college students', *Journal of Studies on Alcohol*, 67, 309-317 and Neighbours et al. (2004) 'Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention', *Journal of Consulting and Clinical Psychology*, 72, 434-447.

- personal driving experiences in which participants have had problems or felt unsafe or at risk, and the behaviours and decisions associated with negative events they have experienced;
- identifying alternative behaviours, decisions or safety margins which can help to reduce the likelihood of negative events;
- identifying personal driving experiences in which participants felt completely safe and in which they were taking no risk – analysis would focus on what they were doing right (e.g. left early, not hurrying, were alert but not speeding, aiming to drive safely, etc.) to positively reinforce safety-oriented behaviours and decisions
- identifying alternative behaviours, decisions or safety margins they believe they can adopt; and
- activities or tools (based on sound behaviour change principles) to facilitate participants' capacity to adopt safer behaviours or decisions.

The focus should be on two key areas:

1. the way participants drive – encouraging a reduction in a few high-risk behaviours, namely poor speed choice/adjustment, close following, poor gap selection, and poor hazard detection, and an increase in complementary safe behaviours;

2. prior decisions and the context which influence safe and unsafe driving – encouraging safer decisions concerning social influences and exposure to high risk driving situations, including the role of peer influences and lifestyle in the decision to drive at night, with passengers, while tired, and leaving on time so speeding is not necessary to be on time, allowing for traffic, etc.

- *Not a single intervention:* A basic tenet is the idea that a single one-shot injection of information is not likely to generate success. Consequently, within the limits imposed by resources, the practicalities of program delivery on a mass scale, and the responsiveness of the target group to a multi-phase program, the program provides a series of opportunities for intervention with a small number of underlying themes. In addition to implementing the program over a period of time, an important goal is to try and extend the effect of the program by imparting skills which participants can apply after completion of the formal program[41].

- *Shared experiences:* The program should make heavy use of the personal experience of participants as a source of material for discussion. Participants' actual experiences of problems, challenges, difficulties, near misses, crashes, and other negative experiences could provide shared examples of unsafe behaviours that will motivate participants to take up safer driving behaviours as a way to avoid them.

- *A focus on facilitated discussion:* The program incorporates facilitated small-group discussions rather than more didactic teaching methods. Participants will be familiar with this style of program and are more likely to perceive the relevance and value of a program presented in this way. The facilitation of discussions will require high-level skills, particularly given the need to incorporate the experiences of participants into the discussion and given the difficulties associated with facilitating an effective, directed discussion among late adolescents with limited verbal skills.

- *Learner driver synergy:* The program should be developed to have conceptual links to the approaches to learner driving being undertaken in Australia under the principles of a Graduated Licensing System. For learner drivers this involves exposure control,

[41] The concept of self-monitoring is an example of a tool which lends itself to on-going application.

limitation of exposure in high-risk circumstances, building experience in all driving situations and linking formal instruction to experience.

- *Timeliness of the intervention:* Education programs are likely to be more effective if presented when the target audience is ready to receive and act on the program's content. As this program relies on using the shared experiences of participants in group discussion, and as part of its focus will be encouraging increased awareness of potential hazards and hazardous situations, the program will require that participants have accrued some solo driving experience. This experience is also necessary to ensure that participants have automated enough basic driving and traffic skills to give them the spare attentional capacity to benefit from the program[42]. McKnight (1985) points out that "until the basic motor skills of vehicle handling are completely mastered, the mind simply does not have the spare capacity to worry about maintaining a safe following distance, anticipating traffic conditions 12 seconds ahead, monitoring overtaking traffic in the rear mirror and maintaining a steady, fuel-efficient speed – all at the same time." (p.112).[43]

[42] For this reason, while the crash risk of novice drivers is highest immediately following licensing, novice drivers at that early stage of their driving career are unlikely to benefit to any significant degree from an education or training program.

[43] McKnight A.J. (1985), 'Driver education - When?', in Mayhew D.R., Simpson H.M. and Donelson A.C. (Eds) *Young Driver Accidents: In Search of Solutions*, (Traffic Injury Research Foundation: Ottawa, Canada).

6 PROGRAM RATIONALE AND STRUCTURE

Program Rationale

The curriculum developer will need to document and reference the proposed rationale which needs to be well-supported by relevant research literature and should be consistent with the material discussed earlier in this document.

It is expected that the program will focus on two key areas of driving:

1. the way participants drive – encouraging a reduction in a few high-risk behaviours, namely poor speed choice/adjustment, close following, poor gap selection, and poor hazard detection, and an increase in complementary safe behaviours;

2. prior decisions and the context which influence safe and unsafe driving – encouraging safer decisions concerning social influences and exposure to high-risk driving situations, including the role of peer influences and lifestyle in the decision to drive at night, with passengers, while tired, and leaving on time so speeding is not necessary to be on time[44], allowing for traffic, etc.

Program structure

The program will have four main modules, which have been identified based on the literature considered for this project, outcomes from a workshop involving young driver experts, the strong view that a one-off, one-day program would be ineffective, and practical considerations associated with the mass roll-out of a program to all novice drivers.

The modules allow for contact with new drivers at the time they obtain a licence, for two facilitated group discussion-based sessions and a follow-up on-road coaching session.

The curriculum developer is strongly encouraged to work within this structure and to assume that the length of the program should not exceed a total of 8 to 9 hours spread over the four modules. If an alternative structure is proposed, it would need to be supported with sound reasoning and supporting research evidence, with consideration to practical issues associated with mass program delivery.

The content and focus of the modules should follow an overall learning process or model, which reflects stages of change and the need for participants to work through and process the issues over the total course of the program. An important principle for the program is that it needs to not only raise potential behavioural options for participants. The program also needs to be conducted at a pace which allows participants to process issues emerging from the group discussion activities, and to allow participants to identify options for themselves that they believe are important and which they can implement.

The suggested general focus for each module is outlined below.

1. ***Module 1 – Management of Exposure*.**

   Module 1 aims to improve participants' understanding of: (a) the relatively high level of

[44] Research conducted in NSW suggests that a key reason given by young drivers for speeding is to get to their destination on time.

their risk during their initial period of solo driving; (b) the situations that present the highest risk for newly licensed drivers; and (c) some strategies to reduce their exposure to high-risk situations.

It will also encourage each participant to make a commitment to implement such strategies from that point on, at least until their attendance at Module 2. The aim of this module is also to increase participants' awareness of risk-related issues that will make it easier to recall specific incidents during modules 2 and 3.

Module 1 will involve the presentation of information only, in the form of a *Management of Exposure to Risk* information pack.

The curriculum developer will be provided with draft content for this module, which they will need to refine and finalise in consultation with the Steering Committee. It is proposed that the information in Module 1 be presented to participants at the time of licensing, in the context of recruitment into the program and the trial.

An additional component might involve a follow-up briefing, after licensing, by telephone or using the Internet, depending on cost-effectiveness and practical considerations. The best delivery option for the information and motivational input in Module 1 will be selected with advice from the curriculum developer.

It should be noted that Control Group drivers will simply be registered. They will be given an information pack but it will not be the same information pack given to the program participants. The curriculum developer will develop this with content provided by the Steering Committee. It will most likely be a pamphlet.

2. *Module 2 – Building awareness of risk, safe driving behaviours and decisions (3 hours).*

Module 2 will be conducted 60 to 90 days after licensing. It will take the form of a three-hour facilitated group discussion, using shared experiences of solo driving since gaining a licence and discussion materials. Trained facilitators will require expertise with young people for group discussion, and need an in-depth understanding of driving behaviour and related areas.

During this time participants will have accrued solo driving experience providing personally relevant experiences as a basis for group discussion, including problems, challenges, and difficult or negative experiences associated with being a new solo driver.

Module 2 aims to create motivation for change among participants and the recognition of their personal need to change specific high-risk driving behaviours and/or decisions.

The objectives are therefore both motivational (using shared experiences of risky driving situations and safe driving situations to motivate participants to take on behaviour change) and informational (awareness of the link between some of their behaviours and increased risk).

The group could generate personal experiences of unsafe situations experienced by group members and the discussion could focus on exploring these in terms of the unsafe behaviours that contributed to them. Discussion should encourage participants to identify the contribution of the key factors of speed, close following, poor gap selection, and poor hazard detection.

The group could also identify personal driving experiences in which participants felt completely safe and in which they were taking no risk – analysis could focus on what they were doing right (e.g. left early, not hurrying, were alert but not speeding, aiming to drive safely, etc.) and the safe behaviours which contributed to situations in which they felt safe and were taking no risk.

Module 2 should also focus on the role of peers in the decisions that lead to driving in high-risk situations, such as at night, with passengers, when tired, and which contribute to safe or unsafe driving, such as leaving on time so speeding is not necessary to be on time, and allowing for traffic, etc.

This could make use of participants' experiences of feeling unsafe in specific driving situations (such as at night, with peer passengers, or when tired) and use the group discussion to explore how participants made the decisions that resulted in driving in those situations. Similarly, discussion could make use of participants' driving experiences of feeling safe and taking no risk, linking these with the safe decisions.

Module 2 must include a self-awareness exercise as a motivator for change. The aim of this is to provide personalised feedback on their risky behaviour and high-risk situations that contribute to their personal crash risk. A draft, which may require some refinement, will be provided to the curriculum developer for inclusion in the curriculum materials. Time to complete the self-awareness exercise will need to be included in this module (unless it is completed on-line prior to attendance at this group-discussion session).

3. ***Module 3 – Encouraging safer driving behaviours, decisions, and managing the driving task (3 hours).***

Module 3 will be conducted one to two weeks after Module 2, and will also take the form of a three-hour facilitated group discussion with the same facilitator and group of participants.

Module 2 leads into Module 3 where the discussion could centre on having the group generate safer alternatives to the unsafe target behaviours and decisions, identifying safer behaviours or decisions which they believe they can change and enhancing participants' capacity to adopt behaviour changes to manage risk.

Module 3 could use the experiences discussed in Module 2, and any experiences in the intervening period, to encourage drivers to take up safer behaviours in relation to speed, following distance, gap selection, and hazard perception, and to reduce their exposure to risky driving situations, through discussion of alternative, safer behaviours and decisions as ways to avoid the risky experiences discussed in Module 2. Similarly there could be a focus on encouraging existing instances of safe behaviours, decisions, and management of exposure.

The objectives of this module are motivational (relating to the potential improvement in safety and avoidance of risk) and behaviour change (the adoption of safer behaviours or safety margins to minimise the risky behaviours and to continue safe behaviours, explored in Module 2).

A possible approach in this module would have participants exploring the situations discussed in Module 2, with a deeper focus on alternative behaviours that they believe they could use to prevent risky situations from developing, to control pressures that will encourage them to revert back to less safe behaviour, and to continue effective strategies that influence safe driving.

A key challenge here is to develop the capacity of participants to identify and implement safer behaviours and decisions, which they believe they can change.

4. ***Module 4 – Putting safer driving behaviours into practice (2 hours).***

   Module 4 will be conducted one to two weeks after Module 3. It will shift from a group-discussion focus to a two-hour personalised driving session. This will involve one-on-one coaching, where the participant works with a supervising driver or 'coach' to further reinforce the learnings of Modules 2 and 3. Trained driving coaches will require expertise in dealing with young people preferably in the driving context. The coach would need to have an in-depth understanding of driving behaviour and related areas and have the skills and personality to take on a coaching role rather than a traditional instructor role.

   Module 4 provides participants with the opportunity to discuss their driving experiences with a 'coach', and to drive their own car in their own normal environment, with the coach as their passenger. The role of the coach is to provide constructive feedback relevant to key safety-related behaviours.

   This module aims to provide real-world reinforcement or confirmation of the safer avoidance behaviours that the participant has agreed to use. It will also rely on positive feedback for driving that makes use of adequate safety margins and safer behaviours.

   A possibility in this module is to encourage the use of safety margins and an 'eco-driving' style as used in the Finnish program for newly licensed drivers. This will require further consideration in consultation with the Steering Committee.

   The curriculum developer will be provided with materials to assist in the development of this module. The driving session will need to ensure key situations and tasks are covered to allow feedback on safety-related driving behaviours.

It is suggested that Modules 2, 3, and 4 will each include a focus on unsafe behaviours associated with crash involvement in novice drivers (speed, following distance, gap selection, and hazard detection and avoidance) and on reducing exposure to risk through effective behavioural decision making (with awareness of this issue raised in Module 1).

This broad sequencing of the suggested program is shown in the table below. In each module, the suggested general focus of discussion and activities is noted in relation to the three issues that flow through the program.

SUGGESTED FOCUS OF THE PROGRAM MODULES

<table>
<tr><th>FOCUS</th><th>MODULE 1
Management of exposure</th><th>MODULE 2
Building awareness of risk, safe behaviours, and decisions</th><th>MODULE 3
Encouraging safer driving behaviours, decisions, and managing the driving task</th><th>MODULE 4
Putting safer driving behaviours into practice</th></tr>
<tr><td>Motivation to change</td><td>Management of Exposure to Risk information pack.</td><td>Self-awareness in relation to driving aptitude, crash risk, and exposure to risky driving situations.</td><td>Harness experiences between Modules 2 & 3.</td><td>Feedback from driving coach in relation to safety issues and future risk.</td></tr>
<tr><td>Behaviours associated with crash involvement</td><td></td><td>Facilitated discussion, discussion materials, and personal experiences in relation to risky and safe situations and participants' choice of speed, following distance, gap selection, and responses to hazards.
Focus should be on recognition of the personal need to change, that driving is a complex task and motivating change.</td><td rowspan="2">Facilitated discussion, discussion materials, and experiences relating to:
• safety margins and safer choices about speed, following distance, gap selection, and hazards, and
• safer decisions that reduce exposure to risky driving situations.
Focus should be on tools to facilitate change.</td><td>Putting safer behaviours into practice in relation to speed, close following, poor gap selection, and hazards with a focus on avoiding risk.</td></tr>
<tr><td>Decisions that reduce exposure to risk</td><td>Information about exposure to risk issues to raise awareness for discussion in Module 2.</td><td>Facilitated discussion, discussion materials, and experiences in relation to exposure to risky and safe driving situations, with a focus on social and lifestyle decisions.</td><td></td></tr>
<tr><td>Putting strategies into practice</td><td colspan="4">Between each module encourage participants to reflect on personal driving experiences, external influences and decisions, and to consider and utilise new strategies and tools to better manage the driving task.</td></tr>
</table>

7 BUILDING A PROGRAM RATIONALE – AN EXAMPLE

Overview

As noted in Section 5 (Guiding Principles), effective behaviour change programs require a sound underlying theoretical rationale.

A sound rationale is required for the general framework of the program and to guide the development of specific activities and content areas that promote behaviour change.

An important early task for the curriculum developer will be recommending and applying coherent behaviour change theories that can operate within the chosen structure of the program. The recommended behaviour change theories will then guide the development of content for the program, especially for Modules 2 and 3.

Working in collaboration with the Steering Committee, the successful curriculum developer will provide a detailed justification outlining the research, evidence-base, assumptions, advantages

and disadvantages of a proposed rationale and approach(es) to be adopted. The curriculum developer should consider and document a range of alternative and/or complementary approaches for effective behaviour change based on supporting evidence, including the example outlined in this section.

The curriculum developer will need to document and reference the proposed rationale which needs to be well-supported by relevant research literature and should be consistent with the material discussed earlier in this document.

Possible behavioural mechanisms

The structure of the program outlined in Section 7 (Program Structure) reflects a broad understanding of some of the factors that have a role in young driver behaviour that might be manipulated in a group-discussion based program. The use of a facilitated group-discussion format focusing on personal experience reflects a general understanding of the best way to influence the behavioural mechanisms that are targeted in the program.

The following examples of behavioural mechanisms ought to be considered within the program structure (see Section 7):

- Module 1: Managing Exposure
    - Behavioural intentions are thought, in some situations, to influence behavioural decisions. Various psychological theories account for this and a range of mechanisms may operate here. Module 1 will provide initial input to raise awareness of high-risk driving situations for novices with the aim of influencing behavioural intentions in relation to driving at night and with peers. The curriculum developer will be provided with draft content for this module, which they will need to refine and finalise in consultation with the Steering Committee.
- Module 2: Motivation for Change/Risk Awareness
    - It is known that young-driver behaviour is influenced by normative beliefs about peer behaviours, with a number of theories incorporating the effect of normative beliefs on behaviour in general. Module 2 will include a self-assessment activity with personalised feedback based on evidence that it is possible to reduce the incidence of some unsafe health-related behaviours by providing norm-related feedback. A draft, which may require some refinement in consultation with the Steering Committee, will be provided to the curriculum developer for inclusion in the curriculum materials.
    - It is known that experienced and anticipated positive and negative consequences can influence behavioural choices. Module 2 could include activities that:
        - focus on the personal experiences of participants in relation to risky situations or situations in which they felt uncomfortable as a way to raise risk awareness and to motivate behavioural change by strengthening the link between the target behaviours and unsafe outcomes. A more detailed theoretical rationale and the associated learning mechanisms for this possible component of Module 2 is outlined at the end of this section.
        - identify personal driving experiences in which participants felt completely safe and in which they were taking no risk – analysis would focus on what they were doing right (e.g. left early, not hurrying, were alert but not speeding, aiming to

drive safely, etc.) to positively reinforce safety-oriented behaviours and decisions.

- Social and contextual factors influence behavioural decisions, and it is known that young drivers are particularly susceptible to the influence of peers. Behavioural decision making theories discuss these issues, and it is expected that Module 2 will include an activity that raises awareness of the risks associated with decisions about driving in high-risk situations to be influenced by peers and other contextual factors which can influence safe and unsafe behaviours. This focus is important because:

    - Novice drivers are susceptible to peer influences as a result of their age and the importance of social influences on their lifestyle choices. Peer influences and lifestyle choices are expected to have a strong effect on the decision to drive in high-risk situations.

    - Decision making in social situations includes an element of automaticity – decisions tend to be made without considering alternatives or the potential negative consequences of the decision if the potential benefits are immediate or meet the person's motivational needs.

    - It is intended that the education program should encourage participants to recognise that some situations have a relatively higher risk associated with them, that the decision to drive is a decision they are able to make and not an automatic behaviour outside their control, and that there are ways to reduce the influence of peer and social factors on that decision[45].

    - The aim of this component of the program would be to encourage driving-related decisions to be shifted into a conscious decision-making mode where it is possible to resist some peer and social influences, and to link a heightened awareness of potential negative consequences to the decision to drive in high-risk contexts.

- Module 3: Adopting Safer Driving Behaviour

    - After increasing (or creating) motivation to change behaviour in Module 2, and allowing participants time between sessions to process the new information, anticipated positive and negative consequences could be used in this module to link anticipated positive outcomes (safer driving) with safer behaviours that are identified by the group members. The associative learning theories that explain the effects of avoidance learning (see example rationale below) also explain this learning about safer behaviours. The possible use of avoidance learning in Module 2 and positive behaviours in Module 3 attempts to provide a balanced approach with full use of learning mechanisms and personal driving experiences.

    - Adult education approaches and theories support the use of group discussions to help participants identify solutions to problems. Social learning theory focusing on self-efficacy is likely to support this approach. It is expected that the content of Module 3 will focus on allowing participants to investigate the issues raised in Module 2 in

[45] There is some evidence that effective health behaviour programs in the smoking area include activities that focus on peer-resistance training in addition to other components noted above. See Millstein et al. (1993), *Promoting the Health of Adolescents*, Oxford University Press. The inclusion of activities addressing the role of peers and how to resist pressures that might increase the risk of crash involvement is expected to improve the program's effectiveness. It is also consistent with the broader behavioural focus of the program in that it focuses on decision making behaviour rather than on attitudes, knowledge, or other stable characteristics.

depth and to develop their own solutions which they believe they can implement, with expert facilitation.

- Module 4: Putting Safer Behaviours into Practice

    - Skill acquisition and behaviour change theories generally stress the importance of applying new skills or changed behaviours in the context in which they are expected to occur. This module provides an opportunity for participants to put the behaviours discussed in Module 3 into practice on the road. The curriculum developer will be provided with materials to assist in the development of this module.

The theoretical bases for each Module and content area will need to be developed by the curriculum developer to guide the development of activities and program materials.

Example of detailed rationale – Avoidance Learning (Module 2)

Module 2 will include activities designed to increase risk awareness and increase (or create) motivation for participants to identify and change unsafe behaviours.

The application of an associative learning model could be considered as one mechanism among a range of options for Module 2.

The basis for using an associative learning approach as one component of the behaviour change approach in this program is that driving behaviour can be understood as the consequence of various factors that increase the tendency to drive unsafely (such as the positive feelings associated with speed and mastery, peer pressure, and so on) and various factors that reduce this tendency (such as moral factors, deterrence associated with police enforcement, fines and the potential loss of licence, safety-related motivation, and actual experiences of negative consequences and the anticipation of future negative consequences).

One possible way the program could affect and motivate behaviour change could be to increase the effect of the factors that reduce risk taking behaviours – such as the anticipation of increased risk of a near miss or a crash, or the anxiety and discomfort associated with being in an unsafe situation. The key benefit of this approach is that it attempts to make use of (and strengthen) an existing factor that influences driving behaviour rather than attempting to stop the action of other relatively stable factors.

This possible use of anticipated risk as a motivator for behaviour change (see below) makes use of a well-researched concept called avoidance learning whereby people may avoid anticipated negative outcomes even when those outcomes are rare events[46]. The use of anticipated regret and

[46] The application of avoidance learning to driver behaviour and crash risk was first suggested by Ray Fuller (Trinity College, Dublin) and has since been expanded into a general theoretical account that contributed to the development of the program approach discussed here. See Fuller (2005) 'Driving by the seat of your pants: a new agenda for research', in UK Department for Transport (DfT) *Behavioural Research in Road Safety 15th Seminar*. A series of unpublished reports prepared for VicRoads in 2002–2005 investigated the potential value of this approach in relation to changing the behaviour of drivers at intersections. An empirical demonstration study was published by Harrison (2005) 'A demonstration of avoidance learning in turning decisions at intersections', *Transportation Research F: Traffic Psychology and Behaviour*, 8, 341-354. Evidence concerning the effectiveness of avoidance learning in experimental and clinical settings can be found in research studies such as that reported recently by De Houwer et al. (2005) 'Avoidance behavior can function as a negative occasion setter', *Journal of Experimental Psychology: Animal Behavior Processes*, 31, 101-106; and in reviews of relevant research and theory such as those in Denny (Ed)(1991), *Fear, Avoidance, and Phobias: A Fundamental Analysis*, Hillsdale, NJ, England: Lawrence Erlbaum Associates.

risk as a motivator, coupled with behavioural avoidance strategies, has been used in health promotion programs[47] and is therefore one possible model for this program.

The theoretical rationale for using this approach as part of Module 2 is as follows:

- The focus of the program is behavioural – to achieve crash reductions it will be necessary to modify key unsafe behaviours that lead to crashes.

- Behaviours that are followed by positive outcomes are more likely to occur again, and behaviours that are followed by negative outcomes are less likely to occur again. The learning mechanism that underlies this effect operates automatically, is not subject to conscious control, and influences behaviour.

  Unsafe driving behaviours are generally associated with positive outcomes such as faster arrival, positive emotions, achievement or mastery, peer support, and so on. Unsafe behaviours are rarely associated with negative outcomes (such as crashes, near misses, etc). While negative experiences are relatively infrequent in individual trips, around half of first-year drivers report involvement in a property-damage crash and most would be expected to have experienced a near miss or to have felt unsafe either as a driver or a passenger.

  One reason drivers continue to engage in unsafe behaviours may be that the balance of positive and negative outcomes for these behaviours favours moderately unsafe behaviours. The factors that increase the riskiness of young drivers' behaviour (such as the effect of peers, the cognitive consequences of limited experience, optimism or self-confidence, the rewards associated with some risky behaviours, etc) are not easy to influence.

  These do not, however, cause an uncontrolled increase in risky behaviours because they are countered by factors that act to reduce the riskiness of behaviour – such as improvements in driving performance with experience and physical discomfort when driving unsafely, linked to anticipation of negative consequences.

- It is not possible to reduce the positive consequences of moderately unsafe behaviour because these will continue to occur outside the program. It must be assumed that moderately unsafe behaviours will continue to be rewarded.

- However, it may be possible to strengthen the factors that encourage a reduction in riskiness – by increasing the perception of negative or unpleasant consequences (such as an increased likelihood of a crash or near miss, increased levels of anxiety or discomfort) for unsafe behaviours. This approach would seek to strengthen the effect of a factor that already operates to limit the riskiness of driving behaviours rather than attempting to add something new to influence novice drivers.

- Increasing the perception that unsafe behaviours result in a reduction in safety can be achieved by personal experiences of this link or by increasing the anticipation of a

[47] Tay R. and Watson B. (2002). 'Changing driver's intentions and behaviours using public health campaigns', *Health Marketing Quarterly,* 19 (4), 55-68, Lewis I.M., Watson B. and Tay R. (In press). 'Examining the effectiveness of physical threats in road safety advertising: the role of the third-person effect, gender, and age', *Transportation Research, Part F: Traffic Psychology and Behaviour*. To varying degrees, both of these studies support the value utilising communication messages that combine threatening information with other information about relevant coping strategies (that can be enacted to reduce the threat). In addition, this issue (and the relevant empirical evidence) is discussed in these two papers.

negative outcome in specific situations. This anticipation of a negative outcome[48] can be generated without actual experience. Activities in which this link is emphasised, imagery-based activities focusing on the link, and mental rehearsal of the link would be expected to result in an increased strength of the link between the behaviour and reduced safety or other negative outcomes – shifting the balance away from unsafe behaviours.

- Using anticipation of unsafe consequences in this way promotes a form of avoidance learning. When unpleasant outcomes are anticipated, there is a dual effect of an increase in anxiety or discomfort when engaged in the target behaviour, and an increasing likelihood that the target behaviour will be replaced by an alternative behaviour with a consequent reduction in anxiety. The increase in anxiety or discomfort motivates a change in behaviour that is then itself reinforced by the reduction in anxiety. This has the dual effect of reducing the likelihood of the target behaviour and increasing the likelihood of alternative behaviours.

- If effective, avoidance learning has the advantage that it does not require that the anticipated unpleasant consequence ever actually occur – its anticipation is enough to elicit a behaviour change, and the reduction in anxiety that results from the behaviour change makes the behaviour largely self-reinforcing. It therefore has a longer term effect on behaviour.

One possible theoretical foundation for content in Module 2 of the program therefore could encourage a reduction in a few high-risk behaviours (speed, close following, poor gap selection, and poor hazard detection) by changing the perceived balance between the perceived negative and positive consequences associated with them to motivate the adoption of avoidance strategies and safety margins. This would be achieved by strengthening the anticipation of potential negative outcomes (such as reduced safety, crashes, near misses, increased anxiety and discomfort) using a range of activities and facilitated discussion that draws on participants' personal experiences.

[48] The use of anticipated regret or anticipated negative consequences to encourage behaviour change is well-researched. See the review by Zeelenberg (1999) 'Anticipated regret, expected feedback and behavioral decision making', *Journal of Behavioral Decision Making*, 12, 93-106. For a recent research study, see Chapman and Couts (2006) 'Emotions and preventive health behavior: Worry, regret, and influenza vaccination', *Health Psychology* 25, 82–90. It has also been suggested as a motivator for behaviour change in the health behaviour area – see Millstein et al. (1993) *Promoting the Health of Adolescents*, Oxford University Press.