



Journal of the Australasian College of Road Safety

Formerly RoadWise – Australia's First Road Safety Journal



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system
expanding
the reach

Special Issue - 2012 Conference *A Safe System: Expanding the reach!* Themes and outcomes

Peer-reviewed papers

- Can technology help teens be safer drivers?
- Challenges for rural and remote road safety
- Contribution of structural incompatibility to asymmetrical injury risks in crashes between two passenger vehicles
- Victorian family day care scheme providers' knowledge of child restraint best practice

Contributed articles

- L2P – learner driver mentor program: extending driver licensing reach in disadvantaged communities
- The 'Yalgoo Experience': applying the safe system approach in a remote setting
- The advantages of the National Road Safety Council as an independent national body promoting road safety in Australia
- Some Reflections on the Conference

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Cover image

Audience participation, 2012 ACRS National Conference. Professor Raphael Grzebieta interacting with Parliamentary Secretary Catherine King during opening session.
Source: C Howe, ACRS Executive Officer.

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The College encourages interested persons and organisations to submit articles, photographs or letters for publication. Published

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From the President



Dear ACRS members,

In our last journal in my opening article I noted an increased level of political leadership in road safety. I concluded with the following; “Many fronts are showing many positive solutions. We should be able to get to our Vision Zero, perhaps more quickly than we had thought.”

This year I have had the opportunity to attend our own Conference in Sydney, the ARRB/ACRS Forum in May in old Parliament House, the National Road Safety Forum in Parliament House and the Research Policing and Education Conference in New Zealand. All were useful; all those who contributed and participated are keen to reduce road trauma.

On reflection though, all the ideas, the research results, all the program examples were not always linked. Many referenced the UN Decade of Action on Road Safety, many reported their work under the banner of the National Road Safety Strategy; many showed results with programs which did show trauma reduction; but I couldn't help but thinking there was no real overarching engagement.

Do we see reduced or more efficient vehicle mobility as a key program, are we too focussed on drivers, technology

and roads, do we really have the right scale of response to the massive road trauma costs, and where is an action plan which includes all the players to address the strategy are key questions I couldn't answer.

Importantly, despite my comments about road safety gains, the national road crash deaths have risen by over 8% so far this year. If we are to achieve what we think is a modest 10 year target set by the National Road Safety Strategy it will become more and more difficult if traction is not achieved early in the period.

So perhaps humble pie from me and a much more coordinated national approach is needed, at a scale commensurate with the size of the problem. I have written a small personal paper on this issue. It is available on the web site. If you have chance to read it, I would welcome any comments you might like to make.

My view is that those of us involved in road safety solutions need to work much more closely together to demonstrate to the broader community to encourage them to recognise and participate in a safe systems approach to reducing road trauma. When we have achieved that task, we may be able to expect more leaders in business, politics, academia, regulation and enforcement and in implementation programs to participate with us at the scale needed to achieve that Vision Zero.

*Lauchlan McIntosh AM FACRS
ACRS President*

Guest Editorial - Associate Professor Teresa Senserrick



A/Prof Teresa Senserrick is the guest editor for this special issue on the 2012 ACRS Australasian Conference - A Safe System: Expanding the reach! Currently working with Transport and Road Safety (TARS) Research at UNSW, Teresa is Chair of the NSW (Sydney) Chapter of the College. She also sits on several committees in the United

States, including inaugural member of the Young Driver Subcommittee and member of the Committee on Operator Education and Regulation of the Transportation Research Board (National Academies of Science), and member of the Association for the Advancement of Automotive Medicine Policy Committee. Teresa is an Associate Editor of BMC Public Health and currently receives salary support from the National Health and Medical Research Council of Australia.

Teresa was the convenor of the 2012 ACRS National Conference, and the College extends its gratitude to Teresa and the NSW (Sydney) Chapter Committee for their assistance in ensuring such a successful event.

The focus of this Special Issue is the 2012 Australasian Conference held in Sydney in August and therefore hosted by the Sydney Chapter Executive. While the safe system has been a theme for some years, we wanted to push the boundaries this year to encourage a focus on those not readily reached by mainstream policies and programs. While marked reductions in road trauma have been achieved in Australia and New Zealand in recent decades, not all road users have benefited from these advances. Our theme *A Safe System – Expanding the Reach!* proved to attract wide participation, with a record number of abstracts received and record sponsorship – for which we are most grateful. Feedback has been overwhelmingly positive, deeming the conference a great success.

This issue highlights key papers and awards from the conference, including manuscripts from two of our distinguished keynote presenters, as well as our best paper and highly commended paper award recipients. These cover diverse themes. A focus on reaching disadvantaged groups includes working with learner drivers struggling to meet requirements for supervised driving hours, multiple road safety initiatives in a remote Aboriginal community, as well as a challenging call to action to address road safety issues in rural and remote areas. Extending education on child safety seats to family day care also features, in addition to a detailed review of new and emerging vehicle technologies and how they might benefit young novice drivers, and an extensive analysis of injury risks arising from crashes between passenger vehicles of differing mass ratios.

Profiled in this issue are the winners of the 3M-ACRS Diamond Road Safety Award 2012 and our latest ACRS Fellow, both announced at the conference dinner. The Deputy Chair of the Sydney Chapter Executive provides continued reflections following his well-received at

conference wrap up and, in addition, a contributed article is included reflecting on the roles and achievements of the National Road Safety Council as their run quietly comes to a close this month. Lauchlan McIntosh, our ACRS National President, is preparing a discussion paper on future leadership for road safety in Australia. This will be shared with ACRS members shortly.

I hope there will be something of interest for all College members in this issue and that the content might inspire many to reflect on ways they might expand the reach within their own sphere as collectively we continue our efforts to improve road safety in our region and beyond.

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Diary

28 November 2012

National Intelligent Transport Systems Awards
Melbourne
<http://www.summitmarketing.com.au/t/ViewEmail/r/E1200C461256C0A1/CD0CD2E29A0425528BD4C707EBCCB890>

4 December 2012

Lismore, NSW. Engineering Australia Seminar
Getting bang for your buck: Design, funding and maximising the use of footpath and cycleway infrastructure
<http://www.engineersaustralia.org.au/events/getting-bang-your-buck-designing-funding-and-maximising-use-footpath-and-cycleway-infrastru-0>

13-17 January 2013

Washington DC. Transportation Research Board - 92nd Annual Meeting <http://www.trb.org/AnnualMeeting2013/AnnualMeeting2013.aspx>.

4-5 March 2013

Sydney, NSW. 4th Road Safety International Conference
<http://www.roadsafety-4conference.com/>

10-13 March 2013

Gold Coast, Qld. Asia Pacific Cycle Congress Conference. <http://apcc2013createsend4.com/t/ViewEmail/y/5370341ADDA416EB/E20F4042ECF0B27BDCC9454293137CA2>

15-17 May 2013

Beijing, China. Road Safety on 4 Continents Conference. <http://www.vti.se/RS4C>



2012 ACRS Conference News

The Governor-General, Her Excellency Ms Quentin Bryce AC CVO, in an opening address to the 2012 ACRS Conference in Sydney encouraged delegates to continue to work to reduce road trauma locally and globally.

Ms Bryce said it was commendable that road safety expertise in Australia was being extended to our neighbours and the world to help reduce the 1.3 million deaths and 50 million serious injuries happening every year from road crashes.

The College Conference, with a theme “*A Safe System: Expanding the reach!*”, heard from national and international speakers, and discussed the potential to act to assist road users often overlooked in mainstream road safety program – including pedestrians, cyclists, heavy vehicles, motorcyclists & rural and remote communities. The national “Diamond Road Safety Award” for an innovative road safety program sponsored by the College and 3M was also announced.

The Parliamentary Secretary for Infrastructure and Transport, the Hon Catherine King MP also addressed the Conference.

Keynote speakers included: Dr Anne T. McCartt, Senior Vice President, Research, Insurance Institute for Highway Safety, Arlington, Virginia USA – “Can technology help teens be safer drivers?”; Emeritus Professor Mary Sheehan AO FACRS, CARRS-Q Faculty of Health –

“The challenges for rural and remote road safety: nothing new really but what can we do about them?”; Mr Nigel Robinson, Manager Aboriginal Programs, Roads & Maritime Services NSW – “Road Safety Challenges for Aboriginal Communities”; Mr David Healy FACRS Co Vice-President ACRS (National) and immediate past Victorian Chapter Chair – “Heavy Vehicles: safety and profit—friends or foes?”

The National President of the College, Mr Lauchlan McIntosh AM, in his opening address reminded delegates that the work of many in road safety from the community, government, business and academia had helped reduce road deaths by over 100,000 in the last 40 years.

He said “While over 33,900 currently die and are seriously injured on our roads in Australia, if we all continue to take a safe system approach with safer roads, safer cars, safer drivers and safer speeds we should expect to reduce that number to at least 17,000 by 2020 and then hopefully to zero. New technologies in cars alone will help reduce crash rates by 50% in this decade.”

Delegates to the Conference came from across Australia and New Zealand and also the USA, South Africa and Fiji.

Conference opening messages

Opening message from the College Patron the Governor-General of the Commonwealth of Australia, Ms Quentin Bryce AC CVO

The Governor-General, Her Excellency Ms Quentin Bryce AC CVO, in her opening address to the Australasian College of Road Safety Conference in Sydney, encouraged delegates to continue to work to reduce road trauma locally and globally.

“As your Patron, I’m inspired by the incredible amount of work being done in road safety across Australia and in our international region. I congratulate the College for creating such a collaborative and inclusive environment to decrease the road toll further.

We know that road safety is a vital issue globally, and the UN Decade of Action for Road Safety gives a much needed focus for action around the world. But there is no room for complacency.

View the full video opening message from our Patron here: http://www.youtube.com/watch?v=Huqpacb_gso

Opening address from the Parliamentary Secretary for Infrastructure and Transport, Hon Catherine King MP



The Parliamentary Secretary for Infrastructure and Transport, Hon Catherine King MP, provided an opening address to delegates, and applauded the Australasian College of Road Safety for its commitment to improving road safety for all users.

“Since record keeping commenced in 1925, over 180,000 Australians have died on our roads, with the cost of road crashes to the Australian economy estimated to be at \$27 billion a year,” Ms King said.

“Annually, 1300 Australians die in road crashes, and 32,000 are seriously injured. Together with organisations like the Australasian College of Road Safety, the Australian Government is committed to reducing death and injury on our roads.”

Parliamentary Secretary King outlined the Government’s agenda but stressed that the goal is a shared responsibility.

“As Parliamentary Secretary for Infrastructure and Transport, I have particular responsibility for promoting and implementing the Australian Government’s road safety initiatives,” Ms King said. “There is much we can, and must, do as a nation to reduce the number of deaths and serious injuries on Australia’s roads.”

“Improving road safety for all road users is something I feel very strongly about,” Ms King said. The Australian Government is firmly committed to a long term agenda for road safety improvement through the actions recommended in the National Road Safety Strategy.”

Read the complete opening address here: http://www.minister.infrastructure.gov.au/ck/speeches/2012/KS06_2012.aspx

Conference wrap up

Some Reflections on the Conference

by *Harry Camkin*
Deputy Chair, NSW (Sydney) Chapter Executive, ACRS

(Mr Harry Camkin, FACRS, presented a summation of the conference for delegates during the closing plenary session)

I was privileged to be invited to “wrap up” the College’s 2012 conference, and in so doing I was able to commend the quality of the many papers and keynote presentations that made a very worthwhile contribution to “expanding the reach” of the Safe System philosophy [1]. I also chose to express some disappointment at what I saw were shortcomings in the scope of the dialogue over an otherwise very constructive two days. These related essentially to the limited amount of discussion on strategic and policy elements of road safety planning that, if fully developed alongside “Safe Systems” in National and State Strategies, could be highly instrumental both in extending the application of this principle, and in facilitating progress towards the overall goals of those Strategies. Thus was missed an opportunity to broaden the focus of the expertise of the road safety community to other elements of the National Road Safety Strategy.

Having had time now to reflect on that summary and the implications of those shortcomings, I welcome the opportunity to offer some more constructive commentary on, firstly, the need to ensure that strategic and policy-level issues are more adequately addressed in the College’s program of conferences and seminars, and secondly, the pressing need to promote many of the policy issues that are identified in current National and State Strategies, but left hanging in the air in the absence of action to progress them.

Conference and Seminar Programs

There is strong competition from professional associations and other organisations for pre-eminence in the promotion of road safety, as there is for the sources of presentation and publication of research papers and other treatises on the subject. While this should not be discouraged, if the College is to be recognised as a major purveyor of expertise from research and operations to policy advice, it needs to demonstrate its capability across this field. Hence this conference's organisers' two-fold objective of building on the success of the College's preceding conference [2] by embellishing the implementation of Safe Systems, and by progressing development of other policies that would maximise the benefits of the strategic planning approach.

Discussion within the College in relation to the National Strategy for 2011-20, including contributions to its Journal [e.g. 3-5], has strongly advocated the pursuit of additional policies to supplement the Safe Systems philosophy. But few participants took the opportunity to address policy or strategic planning issues in their presentations. With hindsight, it is evident that the theme "Expanding the Reach" gave little indication of an objective of seeing how to build strategically on the contribution of "Safe Systems" to the National Strategy, as well as how best to extend its application.

It is suggested that future seminar and conference organisers need to be more specific in stating their objectives and desired outcomes for their programmes, rather than leaving interpretation of the theme to the participants. (As a member of the organising committee for this conference, *mea culpa*.)

Safe Systems – Plus and Beyond?

The elements of Safe Systems are not new to road safety practice. Rather it is their utilisation within a principle that recognises that a degree of redundancy is necessary to allow for the fallibility of both human beings and their manufactured systems. Nevertheless, the success of current National and State Strategies will undoubtedly depend upon how well we are able to further develop and implement both these elements and their framing in accordance with this principle, and the conference made its contribution to this.

But similarly there is very little new in the reference in current strategies to other important principles such as:

- exposure management – from traffic demand to separation of incompatible elements of traffic,
- cost-effectiveness – an element of prioritisation in the application of limited resources both to alternative crash countermeasures and to other programs on the social agenda,
- macro-economic policy - issues such as taxation review, motor vehicle industry, road pricing, even emissions trading, which all have potential to influence road safety in the long run,[6]
- shared accountability and synergy – recognition that many strategies have objectives that align with those of other sectors, such as environment, transport, health, work safety, national productivity, etc, and vice-versa,
- identifying "Lead Agencies" - with accountability for executing the Strategies, and with sufficient authority to harness those synergistic benefits,
- training and capability - development of the capacity of all major players to make the contribution envisaged and expected of them,
- a strategic research program to ensure that adequate resources are available for research that is focussed on progressing the Strategy, and
- marketing of the Strategy itself.

Most of these were mentioned in one way or another in many of the national and state Strategies since 1990. They are also generally intrinsic to road safety advocacy internationally, not least the benchmark work by Howard et al [7] and including the U.N.'s International Decade of Action for Road Safety. Sadly, few of them have progressed far beyond being indicated as a principle or policy yet to be developed. Even the final Action Plan of the 2000-10 National Strategy, commendable as it was in promoting Safe Systems, failed to advance any of these issues. (It is pleasing however to note recent action to work with the National Health and Medical Research Council to establish a National Road Safety Research Strategy, and the College's involvement in this.)

For a while, the most optimistic of us thought that perhaps the National Road Safety Council established in the final years of the 2000-10 National Strategy would take up some of these issues. But none of them appeared on its published list of priorities, its focus being on the tactical level of activity.

It is noteworthy that the Standing Council on Transport and Infrastructure (SCOTI) established by the Council of Australian Governments (COAG) with responsibility for national transport and infrastructure issues makes no reference to the National Road Safety Strategy in its Terms of Reference [8].

Have scores of contributors to our planning strategies merely rubber-stamped these as mother-hood statements, or did they really think they were not worth pursuing? Are they too hard, are they politically inappropriate, will they forever be paid mere lip-service? Or are they just awaiting

a champion – perhaps a re-vamped and independent Road Safety Council with a charter to explore policy issues and promote the National Strategy to all stakeholders? Perhaps a pre-eminent public health advocate who will remind us that prevention is better than cure and that removing the burden of road trauma from the health sector will free up resources for other pressing needs?

Or perhaps a Productivity Commission report quantifying the impact of traffic crashes on national productivity and the consequent opportunity costs to other government and private sector programs?

Maybe we need all of these.

Can the College help?

The College can claim amongst its membership a wide range of skills from research and development through practice and strategic planning to policy analysis. We have academics, consultants, and practitioners highly regarded in Australasia and internationally for their capabilities. It is doubtful however if the College as yet has the credibility, or the resources, and we're probably lacking in the necessary marketing and lobbying skills to advance such an agenda on our own.

Road Safety doesn't appear amongst the priorities of COAG, nor even evidently those of SCOTI, so we probably need, as Mooren [9] has suggested, an assembly of political, bureaucratic, and "technocratic" expertise to elevate it to a level of government priority synonymous with its impact on the community and on other government and private sector activities, as indicated above.

But could we not as a widely-representative road safety community encourage an initiative by our National and Chapter Executives to explore opportunities to ensure that these shortcomings don't languish forever in the "too hard" basket?

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Feedback post-conference

Feedback on the conference from Mr Brian Connor AM FACRS - Letter to ACRS National Office, National Executive and NSW Sydney Chapter

I write to thank you and all of your team for the Conference last week and for inviting me to be a part of it. Congratulations to all concerned on its great success. As a result of this experience I have much to think about.

In a way I felt like a faded Olympic athlete as I look back on what has been achieved over the years. As one of the original College members said to me 'after what it was like in those early days in Armidale, and look at all this that is happening'. This is testimony to the work of many dedicated people.

I believe that you had it right when you chose the 'systems approach' as your theme. All the keynote addresses were excellent and it was most pleasing to see the involvement of the Governor General and Hon Catherine King MP.

Mention was made of the Haddon Matrix on several occasions and I believe that this was very appropriate in that it encouraged our attention towards all aspects of the mix which make up the tragedy of road trauma. There is no doubt that we are making very rapid advances in some parts of this frame of reference - especially in terms of new technology in automobiles. I realise that there is much more to come in this area. Likewise the ANCAP program must be applauded.

We have not done so well, however, in terms of understanding how behaviour may be modified in the traffic system. I have always maintained that this is partly the result of short-term funding contingent on our relatively brief electoral cycles. It may ultimately be in the area of behavioural change that we will discover the greatest cost-benefit reward.

In a world of rapid change the constants are in our failures. It was evident from the Conference that we still have more work to do with data collection, bicycle strategies, rural road safety and finding a place for traffic safety education in an already overcrowded school curriculum. Restriction of speed limits must remain a focus.

Specific issues from the concurrent sessions included work being done to help disadvantaged groups, migrants, those with special needs and teenagers; the development of local community road strategies and their evaluation; the acknowledgement of dangers associated with pulling trailers; the peak incidence of serious rural road trauma in the afternoon; the expansion of the traffic offenders program

in Blacktown (Sydney); new road trauma support services in Western Australia and the dilemma faced over competing environmental and safety concerns in relation to road side trees. Driver distraction is becoming increasingly a major problem - especially as we focus on the special needs of young drivers in the traffic system.

The work being done on indigenous road safety requires particular commendation. This has long been a source of great social disadvantage for this section of the community. Now restorative justice processes for traffic offences need to be included as part of these programs rather than incarceration.

Internationally Australia is making its contribution to global road safety efforts through its contributions via AusAID. We can also reduce our contribution to greenhouse gas emissions through the encouragement of lower speed limits for heavy vehicles. There are exciting developments in the USA in relation to technological review of the way young people drive.

We heard of progress being made with State strategies - especially in Victoria and the recent announcement of a road safety strategy for New South Wales. Likewise great progress is being made in New Zealand. Unfortunately it seems that the National Road Safety Council is to be disbanded in November of this year.

After conferences such as these we should remind ourselves of the more translational research where what we know is implemented as best practice. Greater input from the medical profession would help in this regard.

Our College is optimally placed to give authority to traffic safety deliberations in Australia. We have outstanding leadership and the capacity to promote networking amongst road safety professionals. Not only do we award Fellowships but we can provide a continuing and supportive framework of fellowship amongst each other. Perhaps the last words should come from our latest Fellow, Lori Mooren, who wrote in the definitive year of 1991 on her return from a Healthy Communities conference in Sweden "The main area to be improved in Australia is to shift away from the government ownership towards community ownership of safety/injury prevention". Perhaps that could be a focus for future deliberations.

I look forward to hearing of the College's Olympic flame being lit yet again in a year's time in another part of our nation as we all work together to promote a safer Australia.

Finally, I would like to pay special tribute to Teresa Senserrick and her team in the New South Wales Chapter of our College. They did a mighty job. I hope they feel their efforts were well rewarded.

With best wishes,

Yours sincerely,

Dr Brian Connor AM FACRS

Have your say. The ACRS Journal provides a medium for the expression of views and the sharing of information about road safety. Readers are welcome to submit letters for consideration for publication in the Letters to the Editor section of the journal. Letters may be on any road safety issue and should be no more than 600 words in length. Write to the Managing Editor at PO Box 198, Mawson, ACT 2607 or email journaleditor@acrs.org.au. Views expressed on the letters page are not necessarily those of the ACRS.

Fellowship Award 2012

2012 Fellowship awarded to Lori Mooren



ACRS President Lauchlan McIntosh announced that Lori Mooren was declared this year's Fellow at the ACRS Conference dinner held in Sydney on the 9th of August, 2012. This is the highest honour the College bestows and was awarded in recognition of Lori's long-standing and active practice and leadership in some of Australia's major road safety agencies. Lori has played a significant role in advocacy that has led to successful implementation of major road safety initiatives in Australia and on a global scale.

Since 1989, Lori has worked in a number of roles and capacities in road safety. She began in a road safety campaign manager role at the Roads and Traffic Authority of NSW, coordinating public education messages with other actions, especially traffic enforcement operations. She progressed in the NSW Government to a senior policy role and achieved the lowest road toll for the State in 1998 since records began. Since this time she has continued to work in consulting, research and advocacy roles aiming to reduce the incidence and severity of road trauma.

Lori has been active as a past member of the National Executive and of the Sydney Chapter. She also participates internationally as an active member of the United Nations Road Safety Collaboration.

3M-ACRS Diamond Road Safety Award 2012



The 3M-ACRS Diamond Road Safety Award calls for any road safety practitioner from the public or private sector (which typically includes but is not limited to individuals or teams of road engineers, contractors, road safety officers, road safety equipment manufacturers, asset managers, town planners, etc.) to submit highly innovative, cost-effective road safety initiatives/programs that they have recently developed that stand out from standard, everyday practice and deliver significant improvements in road safety for the community.

A wealth of applications was received this year for the 3M-ACRS Diamond Road Safety Award ranging from government, council, private company and community groups, including service providers, regulatory bodies and advocacy groups. The diverse projects nominated included several targeting components or all aspects of the safe system to improve safety in certain regions or specific high-risk roads or road features (such as roundabouts); not only focusing on vehicle occupants but also pedestrians and cyclists. Several creative design and technology initiatives also featured, such as innovative signage targeting child pedestrians, use of automated number plate recognition technology to identify unregistered vehicles or drivers without a valid licence; and a number of vehicle advances, including intelligent speed adaptation technology, a trip

recording device to assist learner drivers, and an automatic traffic cone placement device for trucks. One state-wide initiative sought to improve access to driver licensing for remote residents, particularly in remote indigenous communities, while others covered a range of educational programs and activities. These included initiatives targeting the high-risk groups of young drivers, motorcyclists, older drivers and drivers with dementia, as well as promotion and assistance with selecting and fitting child safety seats, and initiatives in the niche area of mining sites (including high visibility signage and workshops on key road safety risks).

With such a competitive and diverse range of submissions, all commendable initiatives, choosing a winner was tough, as acknowledged by the ACRS President, Lauchlan McIntosh, who announced that such calibre demonstrated the valuable contribution that road safety projects are making to the Australasian community. Only one winner could be selected and in the end the award went to **Transport of Children and Youth with Additional Needs (TOCAN)**. TOCAN represents a unique partnership that provides a regular forum for learning, discussing and problem solving issues relating to the transport of children and youth with additional needs, providing the impetus for individual members to instigate research, actions and advocacy. Through their collaboration and dedicated effects, TOCAN identified significant gaps in the quality of restraints available for those with additional needs, falling short of Australasian Standards, as well as a lack of knowledge of these seats and Standards among paediatric occupational therapists. Further, as many as one-quarter of families of children with additional needs were found not to purchase the child restraints recommended by therapists. TOCAN continues in its advocacy efforts to raise awareness of government and industry of the issues relating to transporting children with additional needs.

The Award was presented to TOCAN at the conference dinner and accepted by team leaders, Barbara Minuzzo from the Royal Children's Hospital and Helen Lindner from VicRoads on behalf of the 10 team partners, including representatives from the Royal Automobile Club of Victoria, Britax Childcare, the Australian Child Restraint Resource Initiative, the Victorian Paediatric Rehabilitation Service Group at Latrobe University, Autism Victoria and the Association for Children with a Disability (ACD). Congratulations to TOCAN were also delivered in the pre-recorded opening speech of the conference by the College Patron, the Governor-General Ms Quentin Bryce AC CVO, which can be viewed at: http://youtube/Huqpacb_gso.

College news

National Office News

The College would like to extend a warm welcome to Laurelle Tunks, our new Journal Managing Editor. Laurelle is a qualified librarian and comes to us with a wealth of experience in research, indexing and editing publications. She has managed libraries for CSIRO and other federal agencies, and has developed systems and databases to support academic research and peer review processes. With many years experience as an editor she brings skills and knowledge that will enable us to develop the Journal for the future. Laurelle is a welcome addition to our National Office team!

The College received a much larger than anticipated response to our call for applications for the position of Journal Managing Editor, including from many highly skilled professionals with relevant experience in this field. We thank all of our members for creating such a vibrant organisation which in turn has stimulated this enthusiastic response from those wishing to work with us.

Laurelle is looking forward to meeting and working with everyone in the road safety community - and getting started on the next issue of the Journal. If you would like to contact Laurelle about any journal related issues, including submitting papers or articles, or to welcome her to her new role, please do so via journaleditor@acrs.org.au or phone 02 6290 2509.

We would also like to take this opportunity to thank our outgoing editor Deborah Banks for her considerable efforts in producing the last several issues of our journal. We wish her well on her travels through China!

Welcome to New Corporate Members

Welcome to our new Corporate Member, **South Australia Police**.

Chapter Reports

Australian Capital Territory

The ACT and Region Chapter has taken action to revitalise itself following a period in which many of its long term active members took decisions to concentrate on other issues. We wish them well in their new endeavours or in retirement.

A number of well attended meetings have been held since mid-year. These have resulted in the election of a new executive, the development of objectives and a work plan for the next couple of years.

Eric Chalmers is the new president. Eric brings his long and active experience as Chief Executive of Kidsafe Australia and other community organisations to the Chapter. Simon Abbott who is passionately involved in young driver education in Canberra through Road Ready is the Treasurer, Keith Wheatley (ex FORS and NTC) is Secretary, and Lucienne Kleisen from UNSW at the Australian Defence Force Academy is our representative on the National Executive.

The Chapter will move to widen its base by including additional organisations particularly local government in the region and national transport organisations based in Canberra. Already the Yass Valley Council and the Eurobodalla Shire Council have become involved. Other organisations participating are: ACT Department of Justice, ACT Policing, NRMA-ACT Road Safety Trust, Queanbeyan City Council, NSW Southern Area Health, Trucksafe, and ALGA.

The Chapter has set down the following objectives for its operations:

- Support the promotion of road safety in the ACT and surrounding areas.
- Translate into practical activities the research and projects coming out of the NRMA-ACT Road Safety Trust (The Trust) and other research fields.
- Act as an informal mechanism for coordination of other bodies with an interest in delivering road safety outcomes in industry or the community as a whole.
- Organise seminars, workshops, and regional events to showcase and share research and practical activities.
- Advocacy – to provide an independent opinion on road safety in the ACT and the surrounding regions and influence community leaders, legislators and industry on road safety issues.

Two seminars are planned for the 2012-13 year – the first on speed which will be held in February 2013 and the second on rural road safety in March or April 2013. Further activities will be developed for the following two years.

The Chapter has also commenced discussions with organisations with the objective of entering into partnership arrangements with them over the coming months.

Our thanks go to Lauchlan MacIntosh, Claire Howe and Christine Bethwaite from National Office for their support.

Keith Wheatley, ACT Chapter Secretary

New South Wales (Sydney Chapter)

Only a brief report is needed this issue given the main activity of the Sydney Chapter Executive since the last issues has of course been the 2012 Conference – to which this issue is dedicated. In addition, we collated feedback and made a submission to Transport for New South Wales on the Draft NSW Road Safety Strategy 2012-21. Thanks to all who contributed. We anticipate collaborating on one more seminar in 2012 in December regarding a major booster seat education trial and look forward to revitalising our continued seminar series in 2013.

A/Prof Teresa Senserrick, NSW (Sydney) Chapter Chair and Representative on the National ACRS Executive Committee

Victoria

The Victorian Chapter held a seminar on ‘*Graduated Licensing System – A Tale of Two States*’ on 11th September 2012. The seminar featured the following speakers and presentations:

“The impact of an enhanced graduated driver licensing program in Queensland”

- Bridie Scott-Parker and Professor Barry Watson, CARRS-Q

“Interim Evaluation Results on the Impact of Victoria’s Graduated Driver Licensing System”

- Antonietta Cavallo, VicRoads

The seminar was well attended and generated great discussions. Thank you to the speakers for a great seminar! The next seminar focussing on local government and road safety has been scheduled for mid November.

A number of Victorian Chapter members, including myself, had the opportunity to attend the ACRS Conference held in Sydney in August. The conference featured some very informative and interesting keynote addresses and presentations and the feedback have been very positive. Well done to the Sydney Chapter for hosting such a successful conference!

Jessica Truong, Victorian Chapter Chair

Western Australia

The College was fortunate that Dr Peter Palamara was able to attend the 2012 ACRS conference with support from the WA Chapter and C-MARC. Dr Palamara reported that the conference was well run and enjoyable, and excellent value.

The WA Chapter will be running a seminar in conjunction with C-MARC entitled *“The association between sleepiness, long distance commuting and night work on driver performance”* on 3 December 2012. The seminar will be presented by Lee Di Milia, Professor of Management at Central Queensland University. Professor Milia will present the findings and implications of current research investigating variables which impact on night worker driving performance.

The WA Chapter also looks forward to organising a series of seminars in 2013.

Dr Paul Roberts, Western Australian Chapter Chair and Representative on the ACRS Executive Committee

Other news

ANU and NRMA-ACT Road Safety Trust: Continuation of Older Driver Study

The NRMA-ACT Road Safety Trust funded further study on older drivers in the ACT by ANU experts building on original research they had previously undertaken which investigated the relationship between cognitive ageing and aspects of hazard perception.

The most recent study, conducted by Professor Kaarin Anstey, Director, Centre for Research in Ageing and Wellbeing, ANU reassessed after 5 years a sample of older adult drivers in the ACT.

The first aim of this follow up study was to examine changes in older drivers’ physical, cognitive and neurological health over those five years and to determine

what factors predicted safe driving at follow-up. The second aim was to examine the readiness to cease driving and what factors are important to understanding older driver's readiness to transition to a non-driver.

Important messages for older drivers are that older drivers have fewer crashes as a result of infringements (speeding, alcohol etc) and more as result of errors. More than 50% of older driver crashes occur at intersections or while merging. Many older drivers adjust their driving patterns to avoid difficult conditions e.g. peak hour traffic, low light and wet weather. Age related changes in visual and physical functioning and cognitive abilities can be contributing factors and driver screening and relicensing requirements take these factors into account.

The follow up study found that participants reported increased difficulty with driving at night, reversing when parking and freeway driving. The follow up study also examined readiness to cease driving. Driving cessation can be associated with social issues such as isolation and depression, functional impairment and transition into care. Professor Anstey said that "There is potential to avoid these

negative consequences if older drivers are prepared for the transition from driving".

New Guide to safe vehicle travel for wheelchair users

A new resource for wheelchair users and carers, *Wheels within wheels*, has been produced with funding support from the NRMA-ACT Road Safety Trust. The guide includes advice on a range of issues relating to safe travel in vehicles such as choosing a wheelchair, wheelchair restraint systems, transfer equipment such as hoists and ramps, safe parking, legal and insurance issues, and contact details for suppliers and service providers.

Wheels within wheels is available online at www.roadsafetytrust.org.au/wheels, or the printed version of the booklet may be obtained free of charge from ACRS National Office at faa@acrs.org.au or phone 02 6290 2509. Alternatively, contact the Trust Secretary/Manager, NRMA-ACT Road Safety Trust, Linda.Cooke@act.gov.au or phone 02 6207 7151.

Peer-reviewed papers

Making progress in reducing teenagers' crashes: Can technology help teenagers be safer drivers?

by AT McCartt

Insurance Institute for Highway Safety, Arlington, Virginia USA

Introduction

In 2010, 3,115 teenagers (ages 13-19) died in the United States from crash injuries [1]. Such injuries are by far the leading cause of death for this age group [2]. Per mile driven, the crash rate among drivers ages 16-19 in the United States is 3 times the rate for adult drivers for both police-reported crashes of all severities and fatal crashes (Figures 1-2) [3]. Fatal crash rates are particularly high for male teenagers. Teenagers' crash rates are elevated even though they drive less than all but the oldest people.

This presentation summarises the risk factors for teenage crashes, reviews key countermeasures shown to be effective in reducing their crash risk, and discusses how various technologies may be used to keep teenage drivers safer. These technologies, some widely available and some still

emerging in the marketplace, have the potential to reinforce some of the countermeasures proven to be effective in reducing teenagers' crash risks.

Teenage crash risks

The crash risk among novice drivers is particularly high during the first months of unsupervised driving [4-6]. The effect of driving inexperience is shown clearly in Figure 3, which shows elevated crash rates among Canadian novice drivers in the first few months after licensure and relatively low rates throughout the learner stage [4]. This research also found an effect of age; young novices (ages 16-19) had higher crash rates than older novices (age 20 and older) at each month of driving experience.

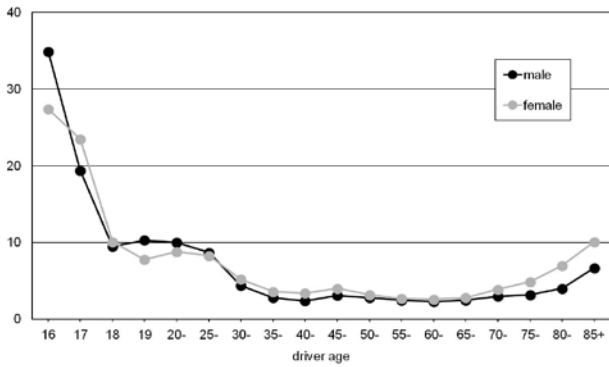


Figure 1. Rates of passenger vehicle driver involvements in police-reported crashes per 100 million miles in the United States by driver age, 2008 [3]

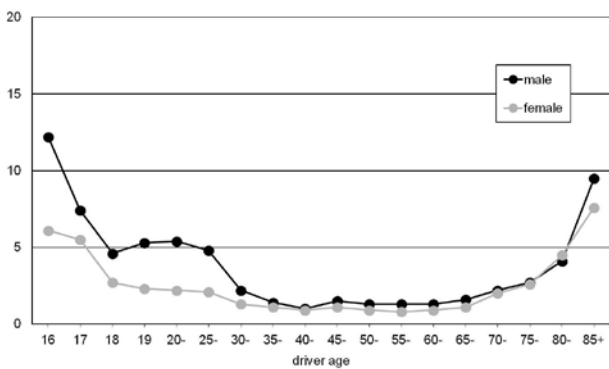


Figure 2. Rates of passenger vehicle driver involvements in fatal crashes per 100 million miles in the United States by driver age, 2008 [3]

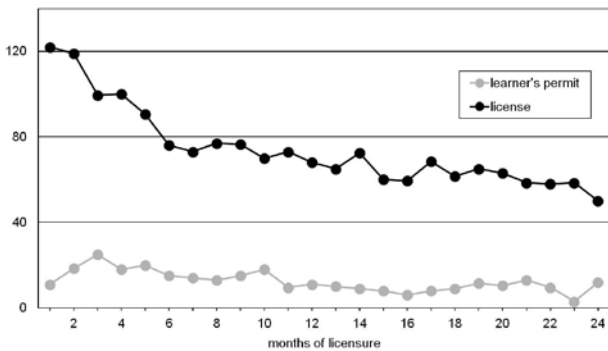


Figure 3. Crashes per 10,000 learner/license drivers by licence status and months of licensure [4]

A number of important crash risks have been identified for U.S. teenagers when they began to drive independently. Per mile driven, fatal crash rates are higher at night for drivers of all ages, but especially for young drivers (Figure 4) [1].

Transporting teenage passengers also is a risk factor (Figure 5) [7]. Compared with having no passengers, the risk of 16-17 year-old driver deaths per mile travelled increases incrementally with one, two, or three or more passengers younger than 21 and no older passengers. In contrast, the presence of at least one adult passenger has a protective effect.

Based on passenger vehicle driver involvements in fatal crashes in the United States in 2010, teenagers were more likely than adults to have been speeding, and male teenagers had higher rates of speeding than female teenagers [1]. Teenagers also were more likely than adults to have driver errors (e.g., following too closely) coded by the police. A study of novice teenage drivers in Connecticut involved in nonfatal crashes found that three factors contributed about equally to their crashes: failing to detect another vehicle or traffic control, speeding, and losing control [8]. Slippery roads also were an important factor. Most failures to detect another vehicle or traffic control involved not looking thoroughly, distraction, or inattention.

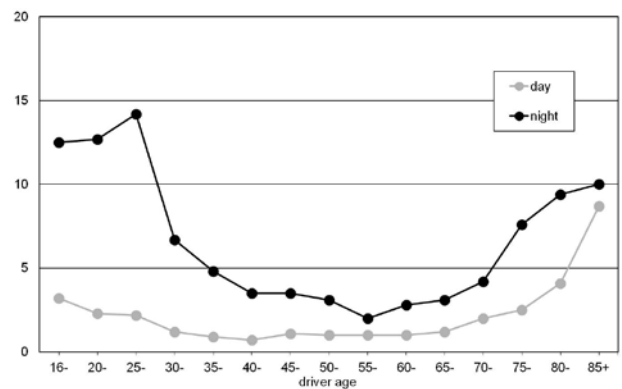


Figure 4. Rates of passenger vehicle driver involvements in nighttime and daytime fatal crashes per 100 million miles in the United States by driver age, 2008 [3]

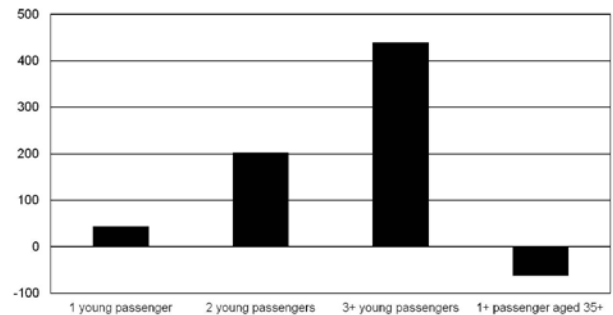


Figure 5. Percentage change in the risk of 16-17 year-old driver crash death per mile travelled with passengers vs. no passengers in the United States, 2008 [7]

In the United States, young drivers are less likely than adults to drive after drinking alcohol, but their crash risk is substantially higher when they do [9]. Among fatally injured 16-17 year-old passenger vehicle drivers in 2010, 16% of males and 13% of females had blood alcohol concentrations (BACs) at or above 0.08% [1]. Among fatally injured passenger vehicle drivers ages 18-19, 31% of males and 22% of females had BACs at or above 0.08%.

Non-belt use persists as a risk factor for injury and death among crash-involved teenage vehicle occupants. Among fatally injured drivers ages 16-19 in 2010, 44% were wearing seat belts; the percentage declined with age, from 49% among 16 year-olds to 39% among 19 year-olds [1]. The rate of belt use was even lower (29%) among fatally injured passengers ages 16-19.

Distractions of any type are likely to be more problematic for teenage drivers than for adult drivers. In the United States, as elsewhere, much attention has focused on the risks of using mobile phones while driving. There are no reliable estimates for the crash risk associated with mobile phone use among teenage drivers, or for the proportion of their crashes involving mobile phone use as a contributing factor. However, teenage drivers' reported phone use is high. A recent survey found that 43% of 18-20 year-olds said they make or receive phone calls during at least some trips, and 17% send text message or emails [10]. Fifty-two percent of 16-17 year-olds with mobile phones reported talking while driving; 34% said they have texted while driving [11].

Proven strategies to keep teenagers safer

Proven strategies to reduce teenagers' crashes and the associated injuries and deaths include countermeasures tailored to address the specific risks of teenage drivers and countermeasures directed at the total driver population.

Graduated driver licensing

Graduated driver licensing (GDL) is a system to phase in young beginners to full driving privileges. Beginning with Florida in 1996, graduated licensing in some form has been adopted in all U.S. states and the District of Columbia. In the United States, graduated licensing laws apply only to young novice drivers, usually people younger than 18. Although not explicitly part of graduated licensing, minimum permit and licence ages are fundamental to all licensing systems. Compared with other jurisdictions around the world, U.S. states license relatively early. Minimum intermediate licence ages range from 14 years, 3 months, in South Dakota to 17 in New Jersey; most states allow a licence at age 16. The minimum learner's permit

age ranges from age 14 (6 states) to age 16 (8 states and the District of Columbia).

From 1996 to 2010, per capita teenage driver fatal crash rates have declined dramatically and at a faster rate than the rates among drivers ages 35-59 (Figure 6) [1]. The fatal crash rate declined by 68% for 16 year-olds and by 59% for 17 year-olds; these are the ages most directly affected by GDL in most states. Smaller but still large declines occurred among 18- and 19 year-olds. All the declines for teenagers were larger than the 35% decline among drivers ages 35-59. These data suggest that graduated licensing laws have been effective in reducing teenagers' fatal crashes. GDL's effectiveness in reducing teenagers' crashes has been shown directly in numerous evaluations of these systems in U.S. states and in jurisdictions in other countries [e.g., 12-14].

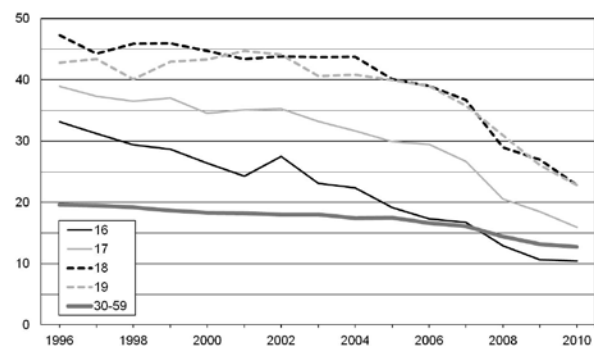


Figure 6. Rates of passenger vehicle driver involvements in fatal crashes per 100,000 people in the United States for ages 16, 17, 18, 19, and 30-59, 1996-2010 [1]

The strengths of states' GDL systems vary widely. In a pair of national studies by the Insurance Institute for Highway Safety (IIHS) and Highway Loss Data Institute (HLDI), strong GDLs were shown to reduce significantly the rates of fatal crashes and insurance collision claims among teenage drivers [15-16]. Based on a rating system developed by IIHS, laws rated good were associated with a 30% lower per capita rate of fatal crashes of 15-17 year-olds, compared with licensing laws are rated poor, and a 20% reduction in the filings of insurance collision claim rates per insured vehicle year among 16 year-old drivers (Figure 7).

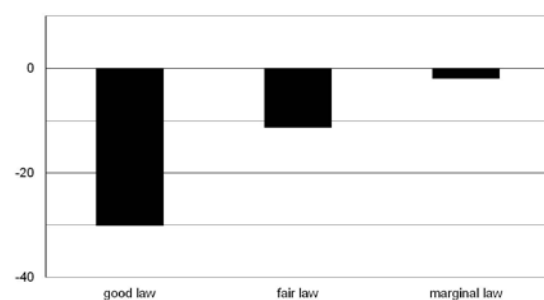


Figure 7. Percentage reduction in per capita fatal crash rates of 15-17 year-olds by IIHS graduated licensing law rating, compared with states that had laws rated poor, 1996-2007 [15]

The studies also found that significant reductions in the rates of fatal crashes and/or insurance collision claims were associated with the relative strength of the following specific graduated licensing components: minimum learner's permit and intermediate licence ages, number of required practice hours, and night and passenger restrictions during the intermediate licence phase [15-16]. These results are summarised in Figure 8.



Figure 8. Percentage reductions in teenagers' crash rates associated with stronger graduated licensing components [15-16]

This research forms the basis of an online calculator that shows in individual states the reductions in the rates of fatal crashes or collision claims that would be expected to result from adopting specific changes in their current teenage licensing laws [17-19]. In contrast to a ratings system, the calculator identifies opportunities for improvement in every state, even those with the strongest laws. A "match the best state" feature allows states to see the estimated crash reductions that could be achieved from adopting the strongest current state provisions.

Crashworthy vehicles with important safety features

Safer vehicles have been instrumental in reducing crash deaths and injuries among vehicle occupants of all ages [20]. Driving a safe vehicle is especially important for newly licensed teenagers, given their elevated crash rates. However, a 2006 IIHS survey of parents of newly licensed teenagers in three U.S. states indicated that many parents were not choosing the safest vehicles for their teenagers and were unaware of the most important vehicle safety features [21]. For example, teenagers tended to drive older model vehicles, which were less likely to have important safety features; 43% were driving vehicles 5-9 years old and 32% were driving vehicles more than 9 years old. In choosing a safe vehicle for their teenager, parents should be encouraged to consider midsize or larger vehicles with good safety ratings and with some of the most important safety features. These features include electronic stability control (ESC), shown to be highly effective in reducing single-vehicle crashes and severe multiple-vehicle crashes [22-23],

and head-protecting side airbags, which substantially reduce the risk of car and SUV driver death in driver-side collisions [24]. So that speeding is not encouraged, parents also should avoid high-powered or sporty vehicles.

Proven and emerging crash avoidance technologies

New vehicles increasingly offer advanced technologies that assist the driver with warnings or automatic braking to avoid or mitigate a crash. These technologies have the potential to prevent or mitigate crashes due to any distraction, inattention, fatigue, sleepiness, or driver error. IIHS research estimated that about 1 in 3 fatal crashes and 1 in 5 injury crashes could potentially be prevented or mitigated if all passenger vehicles were equipped with forward collision warning, lane departure warning, blind spot detection, and adaptive headlights [25]. These estimates assume the best-case scenario for the systems, presuming they perform as advertised and drivers respond to them appropriately. The estimates also reflect the known limitations of the systems available at the time of the study.

Most crash avoidance technologies have not been available long enough for researchers to analyse their effectiveness in reducing crashes. An exception is ESC, which is now required on all new passenger vehicles in the United States. Studies show that ESC is highly effective, reducing fatal single-vehicle crash risk by 49% and fatal multiple-vehicle crash risk by 20% for cars and SUVs [23]. Studies of insurance claims data have reported substantial reductions in all collision claims [26] and claims for rear-end frontal collisions [27] for vehicles with Volvo's City Safety, a low-speed forward collision avoidance system. Claims also have been reduced for vehicles with forward collision avoidance systems that operate at higher speeds and vehicles with adaptive headlights, which help drivers see better on dark, curved roads by pivoting in the direction of the steering wheel [28]. Early analysis of claims data for other types of technologies are either not showing reductions or yielding mixed results.

Even if these features potentially could eliminate millions of crashes, they will not be available in the vehicles most people, particularly teenagers, drive for many years. HLDI research found that it typically takes three decades for a promising safety feature to spread to 95% of the vehicle fleet [29]. As crash avoidance technologies are increasingly available, research will focus on evaluating not only the effects of different systems on crashes but also their acceptance among drivers and driver adaptation, i.e., whether and how driver behaviour changes in response to the technology.

How will crash avoidance technologies affect teenage drivers?

Crash avoidance technologies would appear to be especially promising for reducing or mitigating teenagers' crashes. However, it also is possible that these technologies could result in more secondary task engagement or increased risk-taking that could offset any protective effects. To evaluate how crash avoidance technologies affect teenage drivers, IIHS, in collaboration with the University of Michigan Transportation Research Institute and the American Honda Motor Company, is conducting a field operational test. In the study, to be completed in 2013, 40 teenage volunteers are driving instrumented cars with and without an integrated vehicle-based safety system over several months. The system includes forward collision warning, curve speed warning, lane departure warning, and lane change/merge warning. Research questions include how the technologies affect teenagers' driving behaviour (e.g., headway distance), safety-relevant events (e.g., near crashes or crashes), and engagement in secondary tasks (e.g., mobile phone use). The results for teenagers will be compared with results from an earlier study of adult drivers.

In-vehicle monitoring technology

As noted above, novice drivers' crash risk is highest in the first months after licensure [4-5]. This finding is based largely on research conducted prior to GDL, which seeks to reduce this risk by imposing restrictions during the intermediate licence phase. Researchers compared the crash rate per month licensed for 16-17 year-olds licensed in North Carolina prior to and under the state's GDL [6]. The crash risk was lower throughout the entire 5-year study period for teenagers licensed under vs. before GDL, but the very high crash risk in the first few months following licensure persisted. This suggests that additional countermeasures during this critical period are needed.

It has been suggested that in-vehicle monitoring technologies may help beginning drivers learn some important driving skills sooner than they would otherwise, thereby extending the protective influence of parents beyond the learner's permit stage. A variety of in-vehicle devices are being marketed to parents to monitor where their teenagers are driving, as well as their driving speeds, how aggressively they are driving, seat belt use, and other behaviours. Parents receive feedback on the teenager's performance through a variety of means, including reports via email, text, or phone, or access to a password-protected website. Some devices also provide in-vehicle alerts or other real-time feedback to drivers.

In the IIHS three-state survey of parents, more than half wanted to know whether their teenagers were speeding and

at least a third wanted to know about inattention, mobile phone use, or teenage passengers [30]. Between 40% and 60% of parents said they would consider installing a computer chip that continuously monitored mileage, speed, sudden braking, and sudden acceleration. Only 26-39% said they would consider using a system with a video camera.

Building on this research, IIHS evaluated the effects of an in-vehicle monitoring system on the driving behaviours of teenagers [31]. The device detected all instances of sudden braking, sudden acceleration, exceeding the speed limit (at all and by more than 10 mph), and non use of seat belts. Eighty-four 16 and 17 year-old drivers were assigned randomly to one of four research groups, differing in whether or not an alarm sounded in the vehicle and whether or not parents could access a secure website with notification records of risky driving behaviours. Time trends in event rates per mile travelled were compared. Although the original study design provided no contact with parents after the device was installed, researchers observed few website visits in the initial stages of the study. To encourage more parent participation, families recruited after this point with website access were emailed a brief report card every 2-3 weeks. Figure 9 shows that website visits declined during the study period for parents with and without report cards and that the rate of visits per family was relatively low throughout.

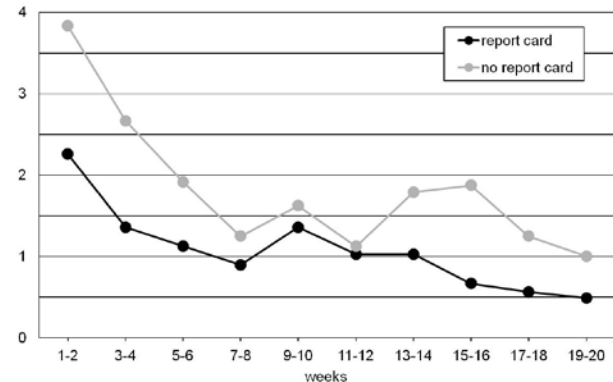


Figure 9: Number of visits to parent websites per family throughout study period for parents with and without emailed report cards in study of effects of in-vehicle monitoring device on teenagers' risky driving behaviours

When the device was activated, rates of sudden braking/acceleration declined for the treatment groups relative to the control groups, especially for the groups with in-vehicle alerts, but the differences were not statistically significant [31]. Seat belt use improved when violations were reported to the parent websites, and improved even more when in-vehicle alerts were activated. Speeding behaviour was reduced only when the alarm sounded in the vehicle, drivers had a chance to correct behaviour before notifications were sent to the website, and speed-related report cards were

emailed to parents every few weeks. Figure 10 summarises results for the group with in-vehicle alerts, delayed parent notification, and emailed reports to parents.

Whether monitoring technologies prove to be an effective countermeasure depends not only on whether they reduce teenagers' risky driving but also on whether they are accepted by families. Even though the study was conducted in a large urban area, recruitment proceeded slowly. Based on interviews conducted at the end of the study, both parents and teenagers thought the overall system was effective in improving teenagers' driving, and most parents said the website and/or device helped them talk to their teenagers about their driving [32]. Parents who declined to participate usually said their teenagers opposed it, or they were concerned about intruding on the children's privacy or jeopardising trust with them.

The researchers concluded that electronic monitoring can reduce risky behaviour among teenage drivers, with more complicated behaviours being more difficult to change. It appeared that effectiveness improved with in-vehicle alerts and direct feedback to parents. The system also worked best when teenagers had a chance to correct behaviour before their parents were notified; this feature may increase the acceptability of monitoring devices as well as their effectiveness. Parental involvement is key to successful behaviour modification, but it is unclear how best to achieve it.

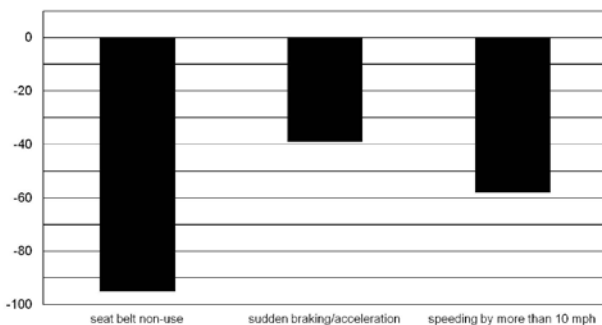


Figure 10: Percentage reduction in risky behaviours with in-vehicle monitoring device for teenagers with alert in vehicle, delayed parent notification, and emailed parent report card [31]

Other potentially beneficial technologies for teenage drivers

Other technologies have the potential to foster safer driving behaviours among all drivers, including teenagers.

Enhanced seat belt reminders

About 15 percent of front seat vehicle occupants in the United States do not buckle up. Seat belt technologies

provide the means to increase belt use. Enhanced seat belt reminders have been shown to increase driver belt use by 3-6% [33-35] and to reduce driver fatality rates by 6% [36]. In the IIHS study of an in-vehicle monitoring device for teenagers, a continuous high-pitched belt reminder virtually eliminated non-belt use for this study group [31]. Despite the effectiveness of enhanced reminders, the U.S. National Highway Traffic Safety Administration (NHTSA) has been prohibited from requiring an auditory belt reminder that lasts longer than 4-8 seconds. Although most 2012 passenger vehicle models sold in the United States have enhanced reminders for the driver (91%) and front passenger (77%), only about one-third meet the Australasian NCAP criteria for enhanced reminders. The 2012 federal Moving Ahead for Progress in the 21st Century (MAP-21) law allows NHTSA to require stronger front seat reminders and directs the agency to undertake rulemaking to require rear seat reminders. It is hoped that enhanced reminders can be used more effectively to boost belt use in the United States.

Mobile phone blocking technologies

Many U.S. states prohibit mobile phone use or texting among teenage drivers. However, a recent observational study of North Carolina teenage drivers found the state's restriction on mobile phone use among teenage drivers had no long-term effect on their phone use [37]. As noted above, crash avoidance technologies may help reduce or mitigate crashes due to any form of driver distractions. In the United States, mobile phone blocking technologies to block or restrict use of mobile phones while driving are increasingly available. With some systems, records of violations or tampering attempts are accessible to parents or fleet managers. The current systems have various limitations. For example, drivers may be able to easily activate the passenger override, GPS may detect motion only above a speed threshold such as 10 mph, and GPS-based systems cannot determine the mode of transportation and activate, for example, when travelling by train. There is scant information on how widely the systems are used by fleets or individuals, and there have been no evaluations of the effects on phone use while driving, driving behaviours, or crashes.

Advanced in-vehicle alcohol detection technology

In the United States, progress in reducing fatal crashes involving alcohol-impaired drivers has largely stalled since the mid-1990s. States increasingly are enacting laws that require all people convicted of alcohol-impaired driving to install alcohol ignition interlocks. A joint effort between the federal government and automakers is underway to develop advanced in-vehicle alcohol detection technology

that would be suitable for installation in all vehicles to prevent starting a vehicle if the driver is illegally impaired (i.e., BAC at or above 0.08%). The initiative, Driver Alcohol Detection System for Safety (DADSS), involves researching, developing, and testing technology that is extremely accurate in detecting driver impairment while being virtually invisible to the driver [38]. The effort also will seek to build public support for the technology. The initiative is in its second phase; two technology developers are developing systems that are accurate, reliable, and durable enough to install in test vehicles. It is estimated that more than 7,000 crashes could have been prevented in 2010 in the United States if all drivers' BACs had been reduced to less than 0.08 percent [39].

Naturalistic study approaches

In addition to various technologies intended to help keep drivers safer, new technologies are expanding the kinds of research that can be conducted to study teenagers' real-world driving behaviours. Using data collected from the vehicle network, continuous video, accelerometers, GPS, and other sources, "naturalistic studies" continuously monitor drivers in instrumented vehicles over weeks and even months, without interference. The studies typically use kinematic data triggers to identify crashes and near crashes (high g-force events) or other "safety-relevant events" (e.g., lane deviation) and may generate samples of control episodes of "normal driving" without events. Naturalistic research conducted in the United States has examined changes in teenagers' driving during the first 18 months of licensure, relative to their parents' driving, and the factors associated with crash/near-crash rates and risky driving, including the presence of adult or teenage passengers [40-41]; observed teenagers learning to drive to understand better the amount and types of practice driving and parental instruction [42]; compared the types of driving incidents during the learning phase and initial stage of intermediate licensure [43]; and measured the occurrence of distracted driver behaviours and potentially distracting conditions among teenage drivers and the relationship between distracting activities and driving performance [44]. Although naturalistic study approaches can gather rich data on what drivers actually are doing and how this affects driving performance, the studies to date have had some limitations. Reliance on g-force measures to identify near-crash events means that some events are not detected. More work is needed to validate the risky driving measures. Information on the context of the driving situation (e.g., type of roadway, speed limit, traffic flow) often is limited. The challenge is to develop thoughtful research questions that will add to our knowledge about teenage drivers, guided by the important questions and not by the most readily available measures.

Some limitations of the naturalistic research to date may be addressed in a large-scale naturalistic study underway in the United States. As part of the second Strategic Highway Research Program (SHRP 2) [45], all the trips of 3,100 drivers of all age and gender groups, including teenagers, will be monitored for 12-24 months. The study will collect a plethora of data on the driver and vehicle, including mobile phone billing records and readings from passive alcohol sensors. In addition, trip data will be linked via GPS to roadway inventory data (e.g., grade, lane and shoulder width, speed limit) gathered by a mobile van. The plans called for data to be collection from late 2010 to November 2013, with complete data files available by March 2014.

Conclusion

Much has been learned about the crash risks of teenage drivers. In the United States and elsewhere, graduated driver licensing programs are reducing this risk. More crashworthy vehicles are keeping all drivers safer, and new crash avoidance technologies have the potential to reduce and mitigate crashes. A variety of other technologies, some directed at teenagers and others directed at all drivers, have the potential to reduce teenagers' crash risk and to enable researchers to expand their knowledge of the teenagers' crash risk.

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Challenges for rural and remote road safety

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Abstract

The growing national and international awareness of the increased representation of serious injuries and fatalities in rural and remote areas is the focus of this paper. Australia was one of the earliest countries to try to address this issue with a targeted national action plan in 1996. This was an important document but the most recent national plan fails to dedicate attention to developing countermeasures for the particular problems of improving road safety in these regions.

The findings of a major program of research in Northern Queensland are discussed to stimulate interest and research into potential countermeasures. Specifically, the need to monitor clusters of crashes as a focus for intervention and local ownership is advocated. Taking action towards a national reduction of speed limits on rural roads and investment in proactive research based trials of drink driving countermeasures such as courtesy buses are strongly advocated.

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Introduction

The present paper discusses a presentation made to the ACRS conference in Sydney in 2012 which was stimulated by the recent National Road Safety Strategy 2011-2020 [1]. This important document that sets the scene for actions across the jurisdictions made the point that there is ‘some evidence that road trauma trends over the last decade have varied between metropolitan, regional and remote areas of Australia though more work is required to better understand and respond to the road safety issues affecting people in different parts of our country’ [1, p19]. This comment is deeply conservative, which is arguably appropriate in an area in which there needs to be justification for both the heavy costs incurred by countermeasures and reasonable evidential support for their potential effectiveness.

However, ‘some evidence’ and ‘more work is required to understand’ suggests more caution than is justifiable from the evidence in the strategy document itself or by reference to the earlier national examination of this area in Australia’s Rural Road Safety Action Plan, “Focus for the Future” 1996 [2]. This plan had required that ‘progress will be formally reviewed and reported to Governments early in 1998, by which date considerable progress would be expected in reduction of the differential in public health road fatality rates between urban and rural sections of Australia’ [2, p6]. The expectation of considerable progress was optimistic and has obviously not been achieved.

There are constraints on direct comparison of the rural crash and fatality rate statistics due to ongoing failures to standardise definitions of rurality across jurisdictions, nationally, internationally and across time. A major review funded by Austroads in 2005 [3] found that state classifications are unique to each state with resultant problems establishing base line statistics or comparing effectiveness of relevant state countermeasures. For example, at the time of the review Queensland Transport varied the definition used for rural and remote roads depending on the particular issue being examined. The most frequent usage was for roads with 100km or higher speed zones [3, p1].

Nevertheless, a comparison of Figures 1 and 2 extracted from the 1996 Rural Road Safety Action Plan [2] and the latest National Road Safety Strategy 2011-2020 [1] make it clear that the issue of road fatalities linked positively to level of rurality has been a consistently and clearly demonstrated finding for more than a decade.

It is always commendable to collect more data and to replicate findings, but it is difficult to determine how an accumulation of similar statistics is going to appreciably affect the conclusion that fatalities are meaningfully and positively associated with the degree of rurality of a crash location. Nor is such a finding unique to Australia. Even



Figure 1. Australian annual road fatality rates per 100,000 population: Australia 1990-1992

Source: Extracted from Australia’s Rural Road Safety Action Plan “Focus for the Future” 1996. [2, p2]

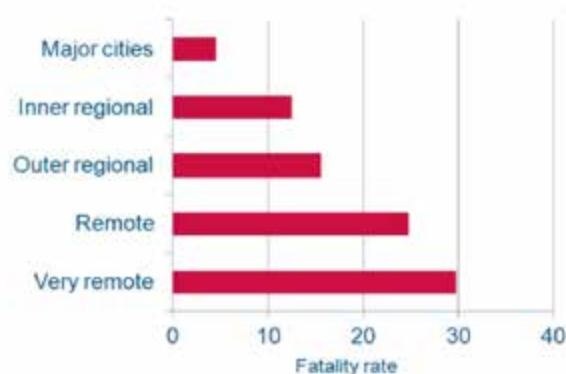


Figure 2. Road deaths per 100,000 population by remoteness area, Australia, 2006

Source: Extracted from Figure 11. National Road Safety Strategy 2011-2020 [1, p25]

given definitional variations, and these are extensive, comparisons with the recent National Centre for Statistics and Analysis (NCSA) figures on American fatality rates by rurality are even more startling [4]. In Australia in 2006-2010 an estimated 700 persons were killed annually in rural and remote crashes [5]. These areas account for 31% of the population and 46% of fatal crashes and 48% of fatalities [6]. The related NCSA figures for 2010 report that in the USA 18,026 persons were killed in rural and remote crashes and whilst only 19% of the US population lives in rural areas 54% of the fatal crashes occur there and 55% of the fatalities [4]. I draw on these findings to suggest that the issue for research consideration is not does an urban-rural differential exist but what are the priorities for countermeasure research?

In addressing this question I will draw on findings from the CARRS-Q Rural and Remote Road Safety Research Program undertaken in association with colleagues from James Cook University in Townsville and Cairns looking at factors influencing crashes in rural and remote north Queensland. The areas selected for the program of research are those areas of North Queensland classified as rural and

remote according to the Accessibility/Remoteness Index of Australia (ARIA+) system of classification [7] that is used for Australian national health statistics. The area covered by the studies included all the geographical region with a southern boundary from the coast at Bowen and West to the SA and Northern Territory border and north to the top of Cape York including those islands classified as within Australian territorial boundaries. It excluded crashes occurring in the urban areas of Townsville and Cairns.

The program was funded and supported by the Motor Accident Insurance Commission of Qld (MAIC) and all relevant central and regional government departments and hospitals. The program included the national review [3] of the actions undertaken in response to the 1996 Plan; a five year review of road crash statistics and socio-demography of the north Queensland rural and remote regions covering the period January 1st 1998 to December 31st 2002 [8]; and a prospective study of all fatal and serious crashes in the area reported in health, police and coroners' records beginning March 2004 and finishing in June 2007 [9]. There were 732 eligible crashes including 119 fatal crashes and 613 hospitalised crashes in which at least one person was hospitalised for at least 24 hours. Police, hospital and where necessary coroners' reports were reviewed for each crash. As part of the study 404 adult hospitalised patients were interviewed about the crash and road safety and 682 persons were recruited at crash sites matched to cases and they completed roadside interviews on the same issues.

CARRS-Q Rural and Remote Road Safety Research - Crashes

As an example of coverage and the types of crashes considered in the research program the identified crashes in the region around the North Queensland town of Ravenshoe are presented in Figure 3.

Ravenshoe has been selected as an example for two reasons. The College of Road Safety has made a recent 3M-ACRS Diamond Road Safety Award to the community collaborative Project RAPTAR [10] coordinated by Sergeant Musumeci from Ravenshoe. The project was a collaborative road safety response to what was considered to be a very large number of crashes experienced in that area. Figure 3 extracts the types of crashes and their locations in Ravenshoe from the rural and remote data sources. This type of cluster of crashes is not unique but represents one of a number of similar clusters of crashes that were identified across the very large geographical area of 661,335.4 km² or 38.1% of the total Queensland land area covered in the major data gathering [8].

There is no typical rural and remote crash though some aspects stand out in the Queensland studies that are replications of the data collected across jurisdictions for the national report [3] undertaken as background preparation for the Queensland Program. A very brief summary of the

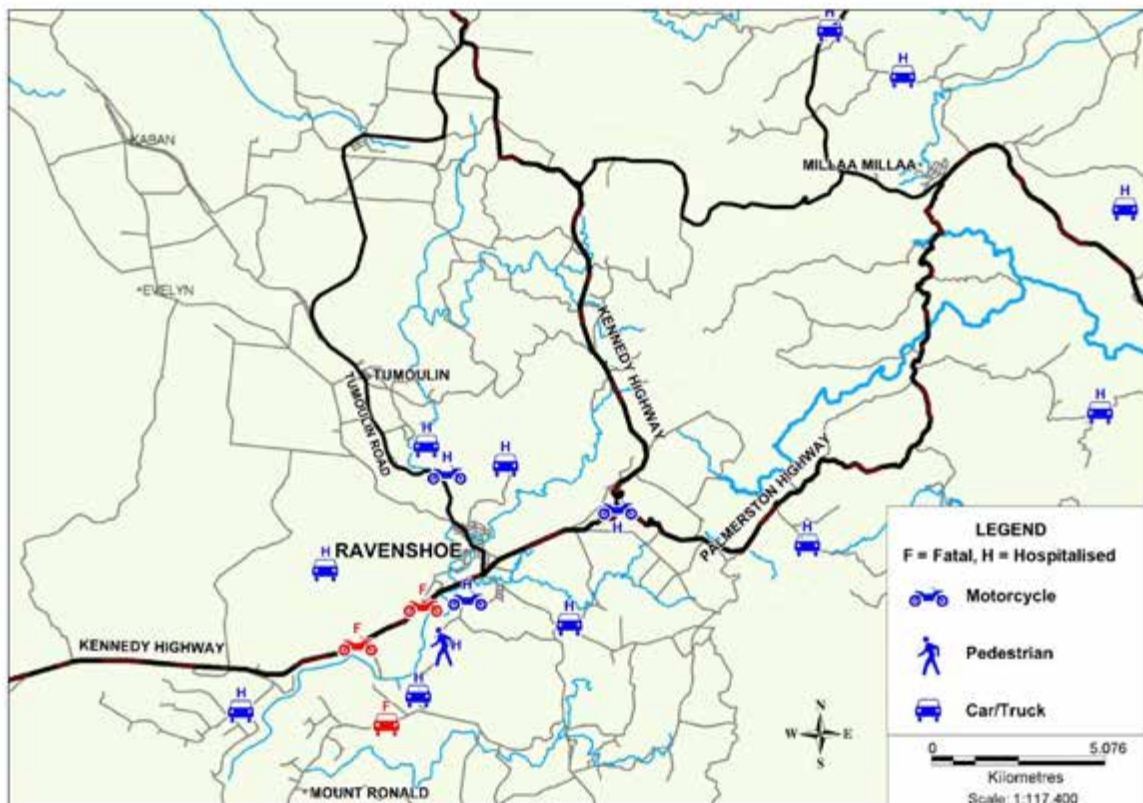


Figure 3. Crash cluster – Ravenshoe: 30.03.2004 – 30.6.2007 [9]

common findings are given here before a closer analysis drawing on differences between fatal and casualty crashes in the North Queensland region [11].

Just on three-quarters (76%) of the people involved in the crashes were male and just over half were aged between 16 and 34 yrs (52.9%). Car and truck drivers and motorcyclists made up the majority of crashes (66%). Crashes occurring across the two days of the weekend accounted for 40% of all crashes and the time period of 12 noon to 6.00pm was consistently the most likely time for a crash across all days. A more detailed analysis by time and day is available in the main study report [9]. The proportion of all study period crashes by time of day is given in Figure 4 [9] with related estimates of exposure.

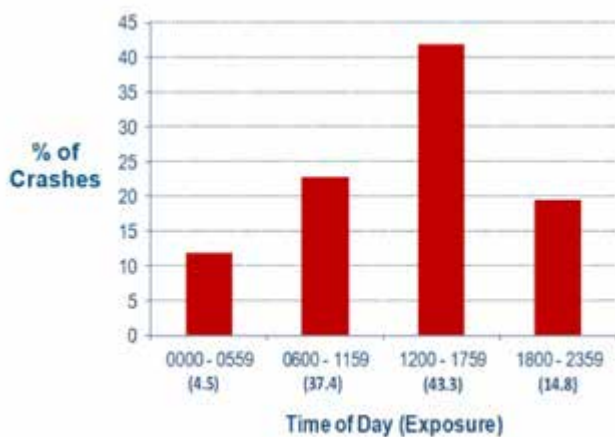


Figure 4. Time of day of fatal and hospitalisation crashes (% exposure) [9, 12]

Estimates of exposure were calculated from annualised hourly Queensland Department of Main Roads vehicle counts in 2005 along a comprehensive network of road segments across the region. On-road measurement was by means of automatic traffic counters [11].

There are numerous limitations to the comparisons drawn in these data. However, they do reinforce the previously identified apparent over representation (12%) of night crashes in the 6pm to 6am period compared with the 4.5% level of travel exposure. They also indicate a lower representation in the morning period. The highest crash involvement of just over two-fifths occurs in the period 12 noon to 5.59pm which corresponds to the exposure measures. The research team argue that there are major challenges for effective intensity of enforcement programs such as RBT and speed camera monitors in the very great distances involved in rural and remote regions. While such programs may target periods of over representation in relation to exposure in metropolitan areas they could have a stronger prevention effect in rural and remote communities by concentrating on the time when most crashes occur.

A more general finding from the study relates to attributed causes for the crashes. It was possible to link over 200 interviewed hospitalised cases who had given their perceptions of the cause of their crash with police records of the same crashes. A similar coding frame was used to match the attributions and the findings are summarised in Figure 5 below.

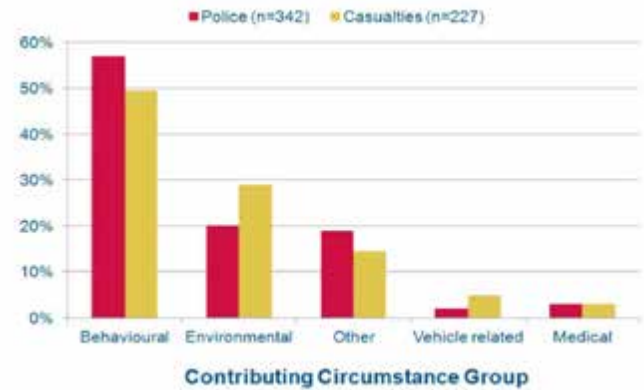


Figure 5. Contributing circumstances to crashes – police and interview reports [9]

There was a surprisingly high level of concordance between contributing circumstances with most cases attributed by both to behavioural factors. The behaviours included in this category were insufficient care and attention, alcohol and drug impairment, traffic violations, speeding, failure to give way, fatigue, disobeying signals and markers and failure to avoid another road user. Detailed analyses of these data are provided in the main study report [9]. There were some differences in attribution and perhaps not surprisingly police were more likely to give behavioural circumstances while the crash-involved respondents gave relatively more attention to environmental factors such as animals on the road, road conditions, etc. Vehicle and medical related factors were only infrequently noted by either reporter.

Finally, one of the issues that frequently arises in discussions of rural and remote crashes is the time taken for emergency retrieval. In this study the mean notification time in minutes to the hospital was 100m, the median time was 78.5m and the Interquartile range was 49-130m. A separate analysis of the fatalities by the surgical team came to the conclusion that in this study the overwhelming majority of fatal road crash casualties appeared to have injuries that were un-survivable at the outset [9, p145].

There is enormous variation in crash circumstances and the crash reported in this female interviewee’s comment cannot be considered typical for a number of reasons. The injured person is female (23.9% of total sample), a passenger (19.7% of total sample) and the crash took place in darkness in a lighted street in a small town (5.5% of total sample). It is quoted here because it reflects contributing

factors frequently mentioned in the interviews and the key behavioural elements most commonly reported by both police and respondents.

“The driver was drunk. It’s his car. He was giving us girls a lift home. Another car wanted to have a race with us and we told the driver “no”. The driver just started to laugh and wanted to race and started speeding up. We all started yelling at him that we wanted to stay alive...We told him that he should put our lives before his but he wouldn’t listen and just drove really fast. Then we hit a drain and the car clunked a few times before smashing into a building. None of us had seatbelts on except the driver.” [13]

From a prevention perspective this quote indicates that the passengers involved were aware of the risks they were taking in travelling with a drink driver, speeding and failing to wear seat belts.


A comparison of fatal and non-fatal crashes

The research program included police reported data on both the fatal crashes and those that involved a person

experiencing more than 24 hrs of hospitalisation. It was possible to compare these records to determine the factors that contributed to the more severe crashes. The major distinguishing difference between crashes leading to fatalities and those with hospitalisation outcomes does not explain the cause of the crash but the severity of the outcome once the crash had occurred. This is the use of a seatbelt and to a lesser extent protective gear in a motor cycle crash. In the sample of crashes where the police indicated that they could determine whether or not protective gear and belts had been used 41% of those in a motor vehicle fatality were not wearing a seat belt compared with 14.5% of those hospitalised. The comparable rates for failing to wear helmets by motorcyclists were lower with 10.5% fatalities and 7% for those who were hospitalised [9, p39].

In terms of road user types, car and truck drivers were more highly represented among fatalities (51.5%) than non-fatal crashes (30%). On the other hand, motorcyclists were less likely to be in the fatal crashes (17.7%) than in the non-fatal crashes (35.6%). Fatal crashes were more likely to occur on the weekend (53.8%). Vertical alignment, roadway features such as T-junctions or crossroads, or presence or absence of traffic control signs did not increase the likelihood of

Can you see the problem?

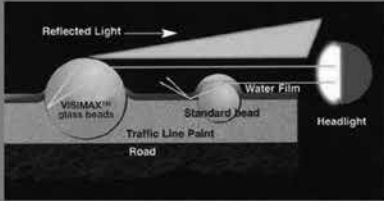


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the crash involving a fatality. Road surface condition was not associated with likelihood of fatality but a curving, horizontal alignment with the view obscured was ($p = .003$). As noted earlier, night time conditions were significantly ($p = .036$) associated with a fatal outcome from a crash. Licence status, including unlicensed and not licensed in Australia, was not more likely to be associated with a fatality. The major factors significantly and positively associated with a fatal crash were the behavioural ones of alcohol use, speeding, fatigue and road rule violations [11]. See Table 2.

When the relative risk ratios for a fatal outcome in serious crashes were derived by modified multiple logistic analysis (see Table 3) the significant factors were alcohol involvement, speeding, high speed conditions (100,110km/h) and road rule violations. What is unexpected from this analysis was that alcohol involvement made an additional contribution to the fatal outcome over and above its probable involvement in speeding. In the context of a crash with the same amount of physical forces,

illegal alcohol levels mean that the person is physically compromised in regard to injury outcomes.

Alcohol involvement

The need to develop countermeasures for reducing alcohol and driving in rural and remote crashes has been long established and recognised [2]. Self reported alcohol use and alcohol involvement in hospitalised injuries and fatal crashes was collected for the study and as noted is significantly related to fatality over and above speeding and other risk behaviours.

Other studies in the program examined whether the self reported drinking and associated behaviours of the interviewed hospitalised sample of drivers (who may or may not have had an alcohol involved crash) were similar to other people in the community in which they lived or whether they were a meaningfully different group. The information provided by the sample ($n=682$) recruited from road side surveys at locations matched to the crash sites

Table 2. Operator factors in fatal and non-fatal crashes

Road condition		Fatal %	Non-fatal %	p value*
Alcohol	Attributed	30.7	13.7	< 0.001
	Not attributed	69.3	86.3	
BAC > 0.05	Attributed	24.0	9.3	< 0.001
	Not attributed	76.0	90.7	
Speeding related	Attributed	18.7	6.6	< 0.001
	Not attributed	81.3	93.4	
Travelling over speed limit	Attributed	6.7	0.9	< 0.001
	Not attributed	93.3	99.1	
Fatigue	Attributed	16.0	11.6	< 0.001
	Not attributed	84.0	88.4	
Distraction/inattention	Attributed	20.0	25.5	< 0.001
	Not attributed	80.0	74.5	
Road rule violation	Attributed	14.7	13.4	< 0.001
	Not attributed	85.3	86.6	

* p values correspond to chi-squared tests between named groups

of the hospitalised sample were analysed for comparisons. Among a wide range of measures the AUDIT C score was used as a measure of self reported drinking levels that would be harmful to the person’s health [14]. While the hospitalised sample were significantly more likely to be classified as harmful drinkers (56.8%) than the road side sample (41.2%) both figures indicate very high levels of drinking by drivers in the rural and remote community. Both groups reported similar levels of drinking alcohol in the previous 24 hours (hospital:43.2%; roadside: 37.5%). Self reported levels of drink driving in the past month were similar and reported by 16.3% of the hospitalised patients and 11.6% of the roadside participants. There was a difference between the two groups in their reports of being a passenger of a drink driver which was significantly higher for the hospitalised group [9, p122].

The role of alcohol as a risk factor in driving was recognised by both these groups. In Table 4, the first ranked 3 of a selection of 20 possible road safety interventions which could reduce crashes are compared between the hospital and road side respondents. The mean scores on the items for each group are reported and then ranked by their mean importance score.

‘Courtesy buses from pubs and clubs’ is given the most important rating by both groups as the best possible strategy for safety. There is not a great difference in mean scores but it is the consistency between the groups that is noted here. A further comparison of the ten highest options selected by those persons reporting harmful drinking levels and those who were either non- or relatively safe level drinkers is given in the following Table 5.

Table 3. Risk ratios, with 95% confidence intervals (95% C.I.), for a fatal outcome in serious crashes in North Queensland, derived by modified multiple logistic analysis

Factor	Risk ratio	95% CI	p value
Alcohol involvement definite	1.71	1.15 – 2.54	0.01
Speeding	2.39	1.61 – 3.55	0.001
Speed limit 70 – 90 km/h	2.00	0.90 – 4.44	0.09
Speed limit 100, 110 km/h	3.53	1.73 – 7.22	0.001
Road rule violation	1.74	1.10 – 2.74	0.02
Curve – view open	1.31	0.91 – 1.87	0.14
Curve – view obscured	1.30	0.87 – 1.96	0.20
Fatigue attributed	1.57	0.93 – 2.65	0.09

Table 4. Top 3 safety interventions ranked in importance by hospital patients and road side sample

Intervention	Hospital patients	Roadside sample
Courtesy buses from pubs and clubs	1.5 (1)	1.6 (1)
Better roads	1.6 (2)	-
Clearer identification of road hazards	1.7 (3)	-
Overtaking lanes	-	1.7 (2)
Roadside test facilities	-	1.8 (3)

Note: Importance rates from 1 = very important to 5 = not important at all

Table 5. Top 10 safety interventions ranked in importance by hospital patients (harmful level drinkers compared with other hospital respondents)

Intervention	Harmful drinkers	Others
Courtesy buses from pubs and clubs	1.5	1.6
Better roads	1.7	1.6
Clearer identification of road hazards	1.7	1.7
Overtaking lanes	1.7	1.7
Road-based fatigue initiatives	2.1	1.9
Loss of licence for serious offenders	1.9	1.9
Improved mobile phone range	1.7	2.0
Roadside test facilities	1.9	2.0
Policing people riding in back of utes	2.2	2.2
RBT	2.3	2.2

Note: Importance rates from 1 = very important to 5 = not important at all

Table 6. Key areas of intervention by cornerstone and geographical (rural and remote) location
Source: *National Road Safety Strategy 2011-2020* [1, p44]

Safe Roads	Safer roads programs targeting run-off-road and head-on crash risk, and safety intersection treatments.
Safe Speeds	Review of speed limits on higher crash risk routes.
Safe Vehicles	Focus on countering run-off-road crashes.
Safe Road Use	Improved access to graduated licensing for disadvantaged groups.

Once again ‘Courtesy buses from pubs and clubs’ is rated as the most helpful safety intervention by both groups. The lower level of importance given to RBT is also of interest.

There was consistent recognition throughout the study that drink driving is an unacceptable risk. People still engage in it or participated as passengers but it was viewed with condemnation and regret. A clear illustration of these attitudes is given in another interview excerpt from the remote community crash quoted earlier. The first part of this excerpt illustrated that the passengers were well aware that they were taking a serious risk driving with someone who had been drinking. This second excerpt describes very strong family and social condemnation of the drink driver and of their folly in being a passenger of a drink driver.

“When we crashed other people had seen it and came over and growled at us for getting in the car with the driver. They also hit the driver for being so stupid and putting us all in danger. All five of us have ended up in hospital.” [13].

It is often recommended that rural and remote people need more media campaigns and education to raise awareness about the risk of drink driving. The present studies suggest that this is too simple a solution. The communities are aware of risks but for lifestyle reasons find it very difficult to avoid the situation. They would welcome organised alternative transport and it is time for this issue to be recognised as a complex one that will need different solutions to those used in the major cities and urban areas.

Recommendations

A comprehensive range of recommendations was developed from the overall research programme findings [15]. Those that are summarised here are confined to the information discussed in this paper. They are placed in the context of the recommendations presented in the current National Road Safety Strategy 2011-2020 [1] and in the earlier 1996 Rural Road Safety Action Plan [2].

A major recommendation of the program was that there should be a similar or if possible, the same classification

used by transport jurisdictions for regional and remote crashes. Use of a nationally developed and comprehensive code would provide consistency in reporting across jurisdictions and linkage for comparison with health status figures. A move to consistency would enable compatibility of outcome indicators and facilitate meaningful evaluation of countermeasures.

The National Road Safety Strategy 2011-2020 identified key areas for intervention in geographical (rural and remote) locations extracted in Table 6.

These are commendable but are not directly responsive to the needs identified in this and other similar studies. Clearly a reduction in speeding levels would reduce fatalities [11] though the catastrophic role of failure to wear seat belts is a leading priority. The 1996 recommendations for speed are extracted below [2, p8].

- Rationalise speed limits on rural roads to provide greater consistency for similar conditions, develop guidelines and tools for nationally consistent speed zoning.
- Use the same guidelines for speed zoning roads through rural villages and towns and in the approaches to provincial cities.
- Introduce traffic calming to increase more moderate speed in rural towns.

These are primarily tailored to the particular needs and issues of rural towns and villages and the 2005 Austroads Review of the implementation of these recommendations found that there had been progress towards implementing them across jurisdictions [3]. In the rural and remote program the speed recommendations were based on the medical findings that speed is the ‘final common pathway’ to serious crash outcomes. The team recommended that lower speeds should be specified for a broader range of roads that include but are not limited to those identified as “high crash risk routes”. Rural speed limits should be reduced to 90km/hr for sealed off-highway roads and 80km/hr for unsealed roads [15]. This recommendation has two goals. The first is a decreased injury severity by reducing crash speeds. The second recognises that there can be a high level of community resistance to lowered road speeds in rural and remote areas. This has been attested by the ongoing political debate in the Northern Territory. The issue here is that change and change acceptance grows through the process of community debate and discussion. Recommendations to change speed limits to more closely accord with road conditions should stimulate increased recognition of the need to drive at a speed limited by road conditions rather than to defined limits. That there is already a degree of recognition of this need was suggested by the counterintuitive crash protective factors of adverse weather conditions found in the study of fatal crashes [11].

The earlier 1996 Action Plan identified a need for localised content of public education in the area of alcohol and an associated need to increase enforcement and utilise new technologies to counter the problems of distance and local attitudes to enforcement. The later National Road Safety Strategy 2011-2020 [1] includes a reference to recognising drink driving as a crash problem area that should be addressed as part of the general ‘safe people’ initiatives. There is no particular consideration of rural and remote drivers in the seven road user groups identified in ‘crash problem areas’ or associated recognition that their needs and potential countermeasures should be specially targeted.

The following recommendations from the present research program related to alcohol are placed in the context that rural and remote communities are characterised by alcohol associated life styles in places where there are few if any public transport options.

- Courtesy buses should be advocated and supported and schemes such as the Skipper project promoted as local drink driving countermeasures in line with the very high levels of community support for these measures.
- Distances impact on the visibility and general deterrence effectiveness of alcohol and speed enforcement programs. These programs should target the period between 2pm and 6pm because of the high numbers of crashes and high levels of potential exposure in the afternoon period throughout the rural region.

These recommendations were made in the context that all groups of respondents almost without exception reported knowledge and attitudes similar to those quoted above in the crash comments. That is, people knew that drink driving was unsafe and considered it involved a quite serious infringement of community and personal norms. In their consistent allocation of courtesy buses as the most likely intervention to reduce road fatalities and crashes they indicated also an awareness and acceptance of a need to find travel alternatives to drink driving. The lower levels of importance given to RBT by these groups probably also reflect personal experience of its reduced impact in a rural context.

There are further recommendations from the research program that should be considered. These policy recommendations are linked to the absolute numbers of fatalities and seriously injured as a direct way of impacting on those most directly affected. Thus it was recommended that in the context of limited funding for interventions the very high representation of males among rural and remote road crash fatalities should be the focus for change. In particular, those males aged between 30 and 50 years who comprise the largest number of casualties must be targeted

if there is to be a meaningful reduction in rural and remote fatalities and serious hospitalisations.

It was considered that timing and local focus was vital for maximum effectiveness given the very great geographical distances involved. The requirement for black spot identification of clusters of accidents in rural areas is relatively tight as for example ‘all areas with more than 6 accidents per square km per year’ [16,p21]. In many cases in the present research program such as the one at Ravenshoe noted earlier this criterion would not have been reached. However, clusters of crashes do occur and can be readily identified by police, local government and the relevant communities who become aware of and concerned by heightened numbers of local deaths and crashes. Any such identification of clustering represents an optimum opportunity to introduce increased enforcement and community change countermeasures. The intervention by Musumeci in Ravenshoe [10] is an example of excellent and timely use of such a cluster as a way to mobilise community response across a range of road safety concerns.

Finally, it is recommended that an interim second Australian Rural Road Safety Action Plan be developed with particular attention to potential countermeasures and commitment to research to address the clearly known need for effective interventions.

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Contribution of structural incompatibility to asymmetrical injury risks in crashes between two passenger vehicles

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Abstract

It is well known that mass ratio affects the probability of injury and death in both vehicles in two-vehicle crashes. Likewise, other evidence suggests that typical four-wheel drive (4WD) vehicles exhibit poorer than average aggressivity such that occupants of regular vehicles are more likely to be injured in a crash when it involves a 4WD. In this study, the ratio of the incidence of injury and death to drivers in two-vehicle crashes was calculated for crashes with different vehicle mass ratios. Injury ratios were calculated for crashes involving strictly two cars and again for those crashes where the heavier vehicle was a 4WD vehicle or a light truck (LT) and the lighter vehicle was a car. There is a common dependence of the injury risk ratio on vehicle mass ratio in both classes of crash, but there is an additional relative risk to the lighter vehicle driver when the heavier vehicle is a 4WD/LT. The effect is stronger for fatality ratios. Around twice as many drivers are killed per crash in car-to-4WD/LT crashes, indicating that the increased risk to the driver of the car is not completely offset by reduced risks to the driver of the 4WD/LT.

Keywords

Aggressivity, Compatibility, Four-wheel drive, Injury risk, Light Trucks, Mass ratio

Introduction

Newer passenger vehicles in Australia are much safer for their occupants than vehicles produced even several years before [2, 16]. Additionally, (and controversially) there is an indication that vehicle mass provides no significant intrinsic protection to occupants over and above the effect of the ratio of masses in a two-car collision [12]. Yet, incompatibility remains an issue for the occupants of cars when their collision partner exhibits traits that make it more aggressive; namely larger mass, and differences in geometry and stiffness.

It is well known that mass ratio affects the ratio of the probability of injury and death in each vehicle in two-vehicle crashes. Also, evidence suggests that typical four-wheel drive (4WD) vehicles exhibit higher than average

aggressivity such that occupants of regular vehicles are more likely to be injured in a crash when it involves a collision with a 4WD. (For an example of early descriptive research on several kinds of geometrical incompatibility in an Australian context, see [18].)

Evans and Frick (1993) [5] showed empirically that the driver fatality ratio R in a two-car crash is a power function of the mass ratio of the heavier vehicle to the lighter vehicle μ . The relationship is shown by Equation 1. The factor A accounts for differences in the colliding vehicles other than mass (i.e. difference in vehicle years, driver differences such as frailty and seat belt wearing, and important geometrical and structural differences etc.)

$$R = A\mu^u \quad (1)$$

Evans and Frick (1993) [5] identified the parameters of Equation 1 in several categories of crash, based on data from the Fatality Analysis Reporting System (FARS) for crash years 1975–1989. The power u derived for all fatal car-to-car crashes (including all model years, all crash configurations, all seat belt configurations etc.) was 3.53. Considering vehicle years >1980, the power u was 2.75. Considering crash type, the variable A ranged from 1.09 (for example in a crash for a rear vs. front impact) to as high as 10 for a left vs. front impact.

Joksch et al. (1998) [13] suggested that u is about 4 for fatal crashes and 2-3 for injury crashes. However, in their empirical fatal data (26-55 year old, non-airbag fatalities) the relationship seemed more consistent with a power of 3.

Many studies have identified the value of R in specific combinations of vehicles and crash types without separately estimating the values of the parameters on the right of Equation 1. These studies have consistently found that Sports Utility Vehicles (SUVs) or 4WDs have an increased aggressivity compared to cars. Fatality ratios in head-on collisions have been estimated at around 5:1 and 30:1 for side impacts [9, 13, 19].

Attewell et al. (1999) [3] noted a growing heterogeneity in the sizes of cars being sold in Australia and found that, for frontal crashes, smaller car driver relative fatal injury risks were 3.6, 6.3 and 17.0 for crashes with medium, large and 4WD vehicles respectively.

Les et al. (1999) [14] focussed on non-fatal, injury crashes based on vehicle mass incompatibilities and found that the relative injury risks for a smaller car driver were 1.12, 1.18 and 1.29 times that of the other driver, when the other driver was associated with a medium, large and 4WD vehicle respectively. For side impacts (into a smaller car) the relative injury risks were 2.25, 2.35 and 2.44 for crashes with medium, large and 4WD vehicles respectively.

Grzebieta et al. (2000) [10] (see also [11]) conducted crash tests to demonstrate one mechanism of increased injury risk to nearside occupants of cars subjected to a side-impact with a 4WD: in each of the crash tests the car driver dummy was subjected to direct contact with the colliding 4WD.

Mayrose and Jehle (2002) [15] examined the effect of vehicle weight and the relative likelihood of fatalities in SUVs and cars in head-on collisions. They found that fatality risk ratios for car occupants compared to SUV occupants were in the order of 3.2 overall, 1.7, when masses were the same (mass ratio 1), and 1.6 even when the car weighed more (on average 234 lb more, mass ratio approximately 1.1) than the SUV.

Some studies have used multiple logistic regression to distil effects of vehicle type in the outcome of two-vehicle crashes. Toy and Hammitt (2003) [21] found that, in the U.S., vans and pick-ups seemed more crashworthy than cars, but there was no clear picture for the crashworthiness of SUVs. They also found that SUVs, light trucks and vans appeared to be more aggressive to all other vehicle drivers, and only pick-up trucks showed increased 'self protection'. Fredette et al. (2008) [6] also found that pick-ups, vans and SUVs showed increased aggressiveness toward cars (particularly for masses equal to or 20% greater than cars) and increased self-protection.

Newstead et al. (2011) [16], using a very comprehensive Australian (and New Zealand) crash data set have, for many years, published used car vehicle safety ratings. These ratings are based on vehicle crashworthiness (relative safety of a vehicle based on driver injuries in the crashed vehicle) and vehicle aggressivity (a vehicle's associated risk of injury to other drivers or vulnerable road users in a crash). They have showed that over the last 30 years, vehicle crashworthiness has improved considerably. When they considered vehicle market groups, they found that, for 4WD vehicles, crashworthiness improves and aggressivity increases with vehicle size (or more specifically, between the market categories compact, medium and large). Similar relationships can be seen for cars. Nearly all 4WD market groups are more crashworthy and more aggressive than all passenger car market groups.

Newstead et al. (2011) [16] did not specifically consider vehicle mass in their analysis, and found there was an

"absence of a strong relationship between the measures of aggressivity and crashworthiness". They also suggest that "vehicle mass is only playing a small part in aggressivity rating relative to vehicle total safety design".

Recently, Teoh and Nolan (2011) [20] examined death rates for 1-4 year old passenger vehicles, SUVs and light trucks in the U.S. for the crash periods 2000-2001 and 2008-2009 to determine whether a 2003 voluntary agreement by vehicle manufacturers to improve compatibility (especially in front-to-front and front-to-side crashes) was effective. Their study suggested that the voluntary changes (particularly through increased fitment of head-protecting side airbags and frontal vehicle design changes) have been effective in the U.S. across all of these vehicle categories. Death rates for car-to-car crashes and SUV-to-car crashes were nearly identical in 2008-09 (controlling for vehicle mass).

In summary, there have been several studies examining vehicle aggressivity and incompatibility in 4WDs and light trucks (LTs), and the asymmetry in crash outcomes when these vehicles hit regular cars. Some studies have examined crash data to understand the effect of incompatibilities on injury risk ratios. However, few have tried to disentangle the components of Equation 1. Less work has been done to examine the net outcomes of such crashes, and the extent to which aggressivity is balanced by crashworthiness in such vehicles is not clear.

The purpose of this paper is to present an alternative method of examining and presenting crash injury risk in two-vehicle crashes, in a contemporary Australian context. This is done primarily by examining injury and fatality ratios and rates by mass ratio and by vehicle combinations in two-vehicle crashes, to identify effects on relative injury risk beyond the effect of vehicle mass ratio. The method is also extended to sparse fatality data, and the effect of incompatibilities on the overall fatality rate is also calculated.

Data

The present analysis is of 87,147 two-vehicle casualty crashes (fatal or injury) that occurred in NSW between 1999 and 2009. The crash records were obtained from Transport for NSW. The crash records were those available through the CrashLink system and these were supplemented with vehicle mass data (tare mass) through the Roads and Maritime Services (previously RTA) Vehicle Registration and Driver Licensing System (DRIVES). Within the sample of 87,147 injury crashes, 1,187 (1.4%) were fatal (the highest degree of injury outcome for an individual crash); the remaining 85,960 (98.6%) were injury crashes.

Of interest was the determination of vehicle types, the vehicle mass ratio, the incidence of specific types of crashes, and the driver injury and fatality rates in these crashes. Focusing on driver injury severity removes any confounding due to the level of occupancy in each vehicle in each crash.

Amongst the 87,147 crashes, there were 174,294 drivers and vehicles. A total of 85,269 drivers were injured (48.9%), 961 (0.55%) drivers were killed and the remaining 88,064 (50.5%) driver injury severities were blank or zero. Around 86% of the crashes in the recorded in the entire NSW sample of two-vehicle crashes involved three vehicle types: cars (sedans/hatches), LTs and 4WDs. These three vehicle types in combination also account for around 71% of the crashes that were two-vehicle crashes.

It should be noted that 4WDs and LTs are generally grouped as a single vehicle type in the analyses (although they were often analysed separately) as they are similar in their frontal geometry and combined, provide greater numbers to work with. Station wagons and utilities were excluded from the analysis. Although a station wagon has similar characteristics to a sedan, it is probable that some 4WD vehicles are coded as station wagons. To prevent dilution of the effect of vehicle type that we wished to detect, station wagons were thus excluded. Utility vehicles were likewise excluded from the analysis.

For the main analysis, two variables were considered; the driver injury ratio and the crashed vehicle mass ratio. The crashed vehicle mass ratio is defined as the mass of the heavier vehicle divided by the mass of the lighter vehicle in any crash. The mass ratios were grouped so that any vehicle mass ratio between 1.0 and 1.099 was grouped as a mass ratio of 1.05, between 1.1 and 1.199 was grouped as 1.15 and so on.

The driver injury ratio is defined as the total number of drivers injured or killed in lighter vehicles divided by the total number of drivers injured or killed in heavier vehicles. The driver injury ratio was calculated for each vehicle mass ratio. Fatalities in lighter and heavier vehicles were also counted, but ratios were not calculated due to the sparseness of the data. A separate analysis was conducted with the crashes that caused a driver fatality.

Within the entire sample, 86,230 drivers were injured or killed. Collisions involving 4WDs, LTs and cars with other cars accounted for 58,165 (67.5%) of the total drivers injured or killed. Not all vehicles had masses recorded (13,919 vehicles of any type – of which 8,797 were cars, 4WD or LTs – either had zero or 9999 recorded against their mass). Also, to reduce the incidence of invalid vehicle types or invalid vehicle masses in the proceeding analysis a filter was applied to the crash sample. Any vehicles with

a coded mass of less than 500 kg, cars with a coded mass greater than 2,000 kg, and 4WDs and LTs with a coded mass greater than 3,000 kg were excluded from the analysis. Vehicles were also excluded when the year of manufacture was unknown.

In total, 52,142 collisions were between a heavier 4WD, LT or car and a lighter car (60.4% of injuries/fatals). Filtering out invalid masses (as discussed above) reduced the sample to 51,309 (59.5% of injuries/fatals), and further filtering for unknown vehicle year, the final sample used in this analysis totalled 50,370 driver injuries/fatalities; 58.4% of the total driver injuries/fatalities within the NSW Crash Database sample.

Analysis and results

Effect of vehicle type on injury ratios

The driver injury ratio is plotted against the crashed vehicles' mass ratio in Figure 1. Figure 1 shows the expected increase in the injury ratio with mass ratio. However, the figure also shows that there are separate relationships for car-to-car crashes and car-to-4WD/LT crashes. A weighted linear regression was applied to the data to account for the variation in numbers of crashes at each mass ratio. The slopes (u in Equation 1) of the weighted regression lines for car-to-car crashes and car-to-4WD/LTs crashes are very similar: 1.50 and 1.53 respectively. This shows the common dependence of the injury ratio on the mass ratio in the crash in both crash types.

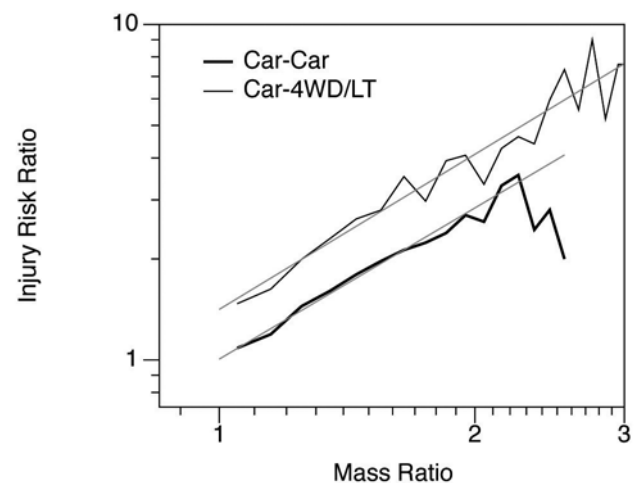


Figure 1. The ratio of driver injuries according to mass ratio for car-to-car crashes and car-to-4WD/LT crashes (New South Wales CrashLink data, 1999-2009)

Intercepts of the regression lines (A in Equation 1) are 1.01 and 1.42. The average mass ratio of car-to-4WD/LT crashes is 1.3. The ratio of the two lines at this mass ratio is 1.41, which can be considered the average increase in the injury ratio in 4WD/LT crashes with lighter cars.

Injury ratios were calculated separately for car-to-4WD crashes and for car-to-LT crashes. The results are plotted in Figure 2. A and u for car-to-4WD crashes are 1.14 and 1.7; for car-to-LT crashes, they are 1.61 and 1.52. The increase in the driver injury ratio (relative to car-to-car crashes) at mass ratio = 1.3 is 19% in car-to-4WD crashes and 61% in car-to-LT crashes. Note that, in the case of car-to-4WD crashes there appears to be a discontinuity at about $\mu = 1.3$, such that at mass ratios below 1.3, there is less difference between car-to-4WD crashes and car-to-car crashes.

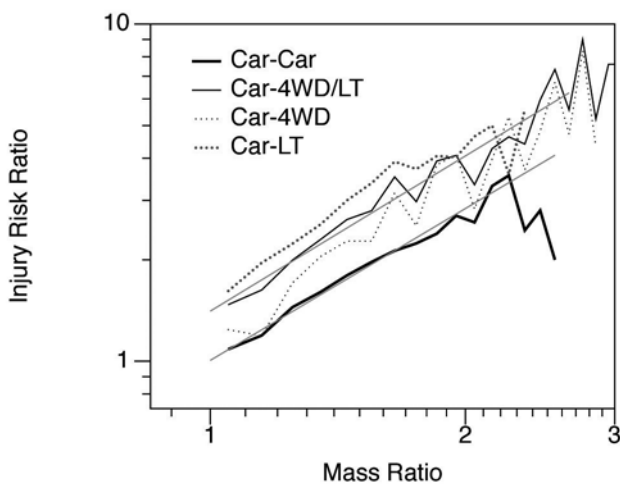


Figure 2. The ratio of driver injuries according to mass ratio for car-to-car crashes, car-to-4WD crashes and car-to-LT crashes (New South Wales CrashLink data, 1999-2009)

Effect of crash type on injury ratio relationships

The foregoing describes an aggregate effect of vehicle combination on driver injury ratio. To see if this effect is consistent across different crash types, the analysis was repeated at several levels of disaggregation; the analysis was repeated while restricting cases to common crash types and in specific speed limits. Due to the comparatively low numbers of 4WDs and LTs in the sample, the analysis in this section considers 4WDs and LTs as a group (4WD/LT) rather than separate vehicle types.

In NSW, crashes can be categorised using Definition for Coding Accidents codes (DCA codes). Ninety six per cent (70,774) of all crashes in the mass/year filtered NSW sample (of 73,709 crashes) were represented by twenty DCA codes. The four dominant crash types represented by six DCA codes in Table 1 account for 74.8% (55,147) of all

crashes in the filtered sample. There were 38,832 (52.7%) crashes between cars and other cars and 15,051 (20.4%) crashes between cars and 4WDs/LTs – these crashes accounted for 73.1% of all the filtered crashes. Table 1 summarises the proportion of crashes (of the total filtered sample of 73,709 crashes) for the vehicles of interest for particular crash types.

Weighted regression was performed on the crash data, and the parameters A and u were found for each crash type and vehicle combination. The relative injury risk ratio (i.e. the injury risk ratio in 4WD-to-car crashes relative to car-to-car crashes) was calculated at $\mu = 1.3$, and the results are given in Table 2.

There is a consistent pattern of increased injury risk ratios for each crash type associated with 4WD/LT-to-car crashes. The difference is greatest for rear end collision types (DCA 301-303) for which the injury risk ratio is 73% higher.

It should be noted that while DCA codes provide a means to describe crash type, they do not always indicate important details about the impact configuration (i.e. which vehicle is being struck and where).

Effect of speed limit on crash severity

The speed limit in which crashes occur can often indicate the average degree of energy involved in those crashes. Hence, the analysis was repeated to examine the effect of crash combination on driver injury ratio within categories of crashes defined by the prevailing speed limit.

The relative injury risk ratios (at $\mu = 1.3$) were relatively uniform with respect to speed zone. For crashes occurring on roads with speed limits of 50 and 60km/h, the relative injury risk ratio was 1.42. For crashes occurring in 70-90km/h and in 100-110 km/h speed zones, the relative injury risk ratios were 1.41 and 1.47.

Subgroups of crashes

Some of the analyses above may have been confounded by the effects of other differences between the vehicles and drivers in the crashes (for example, by driver age and vehicle age, which are both important factors). The analysis of the effect of vehicle type on injury ratios was repeated to remove some of the effects of some potentially confounding factors (at the expense of crash numbers). These were:

- Crashes between vehicles with a similar age (up to 5 year difference).
- Crashes involving 26-55 year old males.
- Crashes between newer vehicles (>1990).

Table 1. Percentage of the filtered sample falling into categories of DCA code and vehicle combinations

Crash Type	DCA Codes	Per cent	Car vs. Car (%)	Car vs. 4WD/LT (%)
All Crashes	All Codes	100	52.7	20.4
Rear End	301-303	34.6	18.4	7.4
Thru-Right	202	17.2	10.3	3.1
Thru-Thru	101	15.3	8.3	3.1
Head-On	201	7.7	3.1	1.8

Table 2. Relative injury risk ratios [(lighter car : heavier 4WD/LT) / (lighter car : heavier car)] at mass ratio = 1.3 by crash type

Crash Type	DCA Codes	Relative injury risk ratio
All Crashes	All Codes	1.41
Rear End	301-303	1.73
Thru-Right	202	1.32
Thru-Thru	101	1.15
Head-On	201	1.26

Table 3. Number of driver fatalities in the heavier and lighter cars, in car-to-car crashes, and expected numbers given from Equation 1 with u set to 2.7

Mass ratio group	Actual Driver fatalities			Expected fatalities given $u = 2.7$	
	Heavier	Lighter	Total	Heavier	Lighter
1.05	19	22	41	19.1	21.9
1.15	21	22	43	17.5	25.5
1.25	4	17	21	7.4	13.6
1.35	5	13	18	5.5	12.5
1.45	7	6	13	3.5	9.5
1.55	3	9	12	2.8	9.2
1.65	1	7	8	1.6	6.4
1.75	0	8	8	1.4	6.6
1.85	0	4	4	0.6	3.4
1.95	0	2	2	0.3	1.7
2.05	0	0	0	0.0	0.0
2.15	0	1	1	0.1	0.9
Total	60	111	171	60	111

Regardless of the driver and vehicle characteristics, the relative injury risk ratios were consistently greater than one for crashes between heavier 4WD/LT vehicles and lighter cars.

The effect of vehicle type on fatality ratios

One of the limitations of the forgoing results is the severity of the injury in each crash. There is no indication whether driver injury was minor or life threatening. In this respect, fatal crashes have a clearer definition, and are likely to be

more uniform in relation to injury severity. However, the numbers of crashes leading to a fatality are much smaller, and figures similar to Figure 1, where specific vehicle combinations and mass ratios are considered, could not be successfully drawn using the fatal crash data. Nevertheless, it was possible to estimate the effect of vehicle type, independent of vehicle mass, by using Equation 1.

In the entire sample of data, 961 drivers were fatally injured; 397 (41.3%) of these fatalities occurred in collisions involving 4WDs, LTs and cars with other cars.

For collisions between heavier 4WDs, LTs and cars with lighter cars, driver fatalities totalled 314 (32.7% of total driver fatalities). Filtering out cases that had invalid vehicle masses (as discussed previously) reduced the sample to 286 (29.8% of total driver fatalities), and further filtering of cases with an invalid vehicle year produced a final sample of 279 driver fatalities, 29% of the total. In the final sample, 171 deaths were in car-to-car crashes and 108 in 4WD/LT-to-lighter car crashes.

To improve the categorisation of vehicle type, the VINs of the vehicles of interest were decoded using data from RL Polk Australia Ltd and matched against the vehicle type as recorded in the NSW crash database. Vehicle types were amended for consistency with market segment data from Polk. Note that this was a partial correction because, where no VIN was available, no correction was possible.

There were 171 car-to-car crashes in which at least one driver died; 60 drivers in heavier cars died and 111 drivers in lighter cars died. The numbers dying in heavier and lighter cars (and the total) were found for several categories of mass ratio. These are given in Table 3.

Given any value of u in Equation 1, there is an expected ratio of the number of deaths in the heavier and lighter vehicles at each mass ratio. Furthermore, a value of u can be fitted to the data to produce the same average expectation of the number of driver fatalities in the heavier and lighter vehicles over all car-to-car crashes. That is, there is some value of u , for which Equation 1 will produce 60 fatalities in heavier cars and 111 drivers in lighter cars, when applied to the numbers of crashes at each mass ratio in Table 3.

A solution for u can be found by iteration. In this case, u was found using the goal-seek function in Microsoft Excel, where the objective was to match the total number of fatalities in the lighter cars. This procedure produced a value of $u = 2.7$ (See Table 3). When this value of u was applied to the total number of crashes at each mass ratio, the result is the expected numbers of fatalities shown in the two right hand columns of Table 3.

In the case of car-to-4WD/LT crashes, there were two parameters to find: u and A . However, we have seen, in the case of injury crashes, a common dependence of the injury ratio on mass ratio (for example, the slopes in Figure 1 are very similar at 1.50 and 1.53). Hence, an initial estimate of u for car-to-4WD/LT crashes is 2.7, given that $u = 2.7$ for car-to-car crashes.

Table 4. Number of driver fatalities in heavier 4WD/LTs compared to lighter cars in car-to-4WD/LT vehicle crashes, and expected numbers from Equation 1

Mass ratio Group	Actual Driver fatalities			Expected numbers given $u = 2.7$ and $A = 3.5$ in Equation 1	
	Heavier	Lighter	Total	Heavier	Lighter
1.05	0	2	2	0.4	1.6
1.15	2	9	11	1.8	9.2
1.25	2	8	10	1.4	8.6
1.35	0	7	7	0.8	6.2
1.45	0	10	10	1.0	9.0
1.55	1	12	13	1.1	11.9
1.65	1	9	10	0.7	9.3
1.75	2	10	12	0.7	11.3
1.85	0	8	8	0.4	7.6
1.95	1	5	6	0.3	5.7
2.05	0	2	2	0.1	1.9
2.15	0	3	3	0.1	2.9
2.25	0	4	4	0.1	3.9
2.35	0	2	2	0.1	1.9
2.45	0	2	2	0.0	2.0
2.55	0	1	1	0.0	1.0
2.65	0	2	2	0.0	2.0
2.75	0	2	2	0.0	2.0
2.85	0	1	1	0.0	1.0
Total	9	99	108	9	99

Table 4 shows the number of driver fatalities in the case of car-to-4WD/LT crashes in which at least one driver died. Also shown is the expected distribution of fatalities between the two vehicles, given $u=2.7$ and $A=3.5$. (As above, A was found using iteration, where the objective was to match the total number of car driver fatalities in the lighter and heavier vehicles in Table 4.) These values for u and A result in expected numbers of driver deaths that match the data overall, and closely at almost every mass ratio. This is indicating that the effect of the larger vehicle being a 4WD/LT is to inflate the fatality ratio by 3.5 times (noting that this is dependent on $u=2.7$). Notable too is that the fatality ratio in the first two categories of mass ratio (where the vehicle masses are similar) is about 5.

As a check, the procedure described above was repeated, but only for crashes in which the VINs of both vehicles were known, and in which Polk decoding provided an independent categorisation of vehicle type. This resulted in estimates of $u=2.4$ and $A=3.9$.

Ideally, the estimates of u and A would be made using more sophisticated statistical methods. In the above analysis, error in the estimate of A will be compounded by error in the estimate of u . For example, logistic regression of driver injury severity on vehicle types and mass ratios might allow u and A to be estimated simultaneously using all crashes at once. Importantly, it would allow the calculation of confidence intervals on estimates of u and A . It is notable that the estimate of u in this study is at the lower end of estimates made by Evans et al. (1993) [5]. A higher value of u would have the effect of reducing the magnitude of A .

It is also important to note that u and A are unadjusted for effects such as differences in the build year of the vehicles or occupant characteristics. A difference in the build year of vehicles can have a marked effect on determining in which vehicle a driver is killed [2]. In the case of the car-to-4WD/LT crashes in this sample, the average year of manufacture of the cars was 1991 and the average for the 4WD/LT was 1996, and this could be substantially affecting the results. These average ages also emphasise the fact that the results here refer to a historical fleet, and are not necessarily a guide to the outcome of the crashes within and between future cohorts of vehicles.

Fatality rates of drivers between vehicles of different mass

The finding of a higher fatality and injury ratio when the heavier vehicle is a 4WD/LT is likely to arise both from aggressivity of the 4WD/LT as well as a degree of self-protection. The foregoing results do not inform us whether the overall fatality risk in a crash is increased by the effect of a vehicle mismatch.

For this reason, fatality rates are considered in the next analysis. Table 5 shows driver fatality rates per 100 crashes in the sample, for the different vehicle combinations where the first vehicle is the heavier vehicle and the second the lighter vehicle.

Table 5. The number of fatally injured drivers per 100 crashes for particular crash combinations

Heavy vs. Light	Fatals ¹	Fatally injured drivers per 100 crashes ¹	Crashes ¹
Car vs. Car	171	0.44	38533
4WD vs. Car	60	1.04	5779
4WD/LT vs. Car	117	0.92	12686
LT vs. Car	57	0.83	6907

¹Injury or worse

Table 5 tells an interesting story. When the heavier and lighter vehicles were both cars, one driver was killed every 225 crashes. When the heavier vehicle was a 4WD/LT vehicle and the lighter vehicles was a car, one driver was killed every 108 crashes. Though not shown in the table, when the two vehicles were light trucks, one driver was killed every 80 crashes (based on 643 crashes), when the two vehicles were both 4WDs only a single driver was killed in the relevant 390 crashes.

Considering crash severity (that is, the maximum injury severity of any occupant in the crash) and not the driver fatality rate, 0.59 per 100 crashes involving two cars were fatal. When the other vehicle was a 4WD/LT, the rate was 1.25 per 100 crashes.

Driver Fatality Rates by speed zone and location

There may be several potential confounding factors that may be affecting the results presented above. Differences in vehicle year have already been mentioned. When considering rates, probably the most significant is the speed of the crash. If 4WD/LT crashes with cars occur in higher speed zones, then a higher overall fatality rate might be expected. Such factors could be taken into account with more sophisticated statistical methods, such as logistic regression. In the interim, the fatality rates were examined in sub-groups of crashes that are likely to have crash speeds most in common. Two specific crash categories were considered, crashes in urban 50 and 60km/h speed zones, and crashes in rural 100 and 110km/h speed zones. Table 6 shows the results.

Table 6. Number of driver fatalities and the driver fatality crash rate based on area and speed zone

Crash Combination	Urban 50 and 60 km/h			Rural 100 and 110 km/h		
	Driver fatalities	Fatally injured drivers per 100 crashes	Crashes	Driver fatalities	Fatally injured drivers per 100 crashes	Crashes
Car vs. Car	26	0.11	24683	61	6.22	981
4WD vs. Car	16	0.47	3369	16	5.97	268
4WD/LT vs. Car	21	0.30	7027	42	6.13	685
LT vs. Car	5	0.14	3658	26	6.24	417

Note that in Table 6, there were no driver fatalities in the heavier 4WD or LT vehicles in urban 50 and 60 km/h crashes. In the rural 100 and 110 km/h crashes, only three of the 42 driver fatalities occurred in the 4WD and LT vehicles.

In urban 50 and 60 km/h crashes, driver fatality rates were more than double (2.7 times) when a heavier 4WD/LT crashed with a lighter car, compared with the rate when a heavier car crashing with a lighter car. Driver fatality rates in 100 and 110 km/h rural areas were higher than the rates in 50 and 60 km/h urban areas, in all categories of vehicle crash combination, but there was very little difference in driver fatality rates across categories. It is possible that the issue of structural incompatibility at higher speeds may not be the primary cause of increased risk of death in cars in these crashes and it is more likely the result of the high delta-v in these crashes. However these increased risks appear to be effectively offset by reductions in risk to 4WD/LT drivers in such crashes.

There was some evidence within the fatal crash data that suggested that there were more head-on crashes and fewer side-impact type crashes in rural 100 and 110 km/h areas, compared to crashes in urban 50 and 60 km/h areas. It is therefore possible that the higher driver fatality rate in 4WD/LT vs. car crashes in urban 50 and 60 km/h areas may be due to the higher incidence of side impact crashes in these areas, although the crash data did not contain enough information for us to be able to confirm this.

Concluding remarks

This paper describes some exploratory analyses on the present situation based on the most recent and complete crash data available for one Australian state, with regard to 4WD/LT incompatibilities in Australian crashes. It is clear from the analysis that, consistent with previous findings, crashes involving a car and a 4WD/LT are

resulting in increased injury and asymmetry in injury, than crashes involving two cars. The effect is in addition to and apparently independent from the effect of vehicle mass ratio. The effect in injury crashes was to increase injury ratios by about 1.4 times relative to car-to-car crashes. The effect seems greater when the heavier vehicle is a LT, rather than a 4WD.

The effect on fatalities was greater – approximately 3.5 times. Fatality rates in 4WD/LT-to-car crashes are consistently around twice as high as they are in car-to-car crashes, overall and in sub-groups of crashes, but no different in higher speed zones. Some caution is required as differences in 4WD/LT vehicles and the cars that they hit may relate to factors beyond geometry and may include differences in crashworthiness (the 4WD/LTs tend to be newer than the cars they hit), although results tend to be stable when these differences were narrowed.

It is therefore reasonable to assume that well-known factors related to the stiffness of the vehicle structures that interact in the crash are manifesting themselves in the result. These factors might include the over-riding of the car crash structures by the 4WD/LT, direct contact between the driver of the car with the 4WD/LT in side impact crashes and the high prevalence of bull bars on 4WD/LTs [4].

An agreement to reduce vehicle incompatibility made by Enhanced Vehicle Compatibility (EVC) group in the U.S. has been tentatively associated with a decrease in fatal crash rates between newer SUV/LT-to-car crashes in the U.S. [20]. Part of the EVC commitment was the fitting of head-protecting side airbags on all passenger vehicles by September 2009. A similar agreement was made by member companies of the Australian Federal Chamber of Automotive Industries (FAI) for all vehicles built from January 2016 [7]. As of mid-2010, the standard fitment rates of curtain airbags on new passenger vehicles in Australia was about 45% [22] and recent data on vehicle sales in South Australia indicates that new vehicle fitment

rates of side curtain airbags was around 70% in the third quarter of 2011 [8].

The results in this paper are based on historical crash data, and (as mentioned) there is some tentative evidence to suggest that incompatibility between newer 4WD/SUV/LT crashes and newer cars may be diminishing. However, there are several factors that need to be kept in mind:

- The average age of the registered vehicle fleet in Australia is about 10 years.
- Crash involved vehicles are older still [1].
- The prevalence of bullbars fitted on 4WD/LT vehicles in Australia is around 50% [4].
- While 4WD/LT-to-car crashes are not as common as car-to car crashes, the trends (not published here) suggest that the incidence of 4WD/LT-to-car crashes in absolute terms, as well as in relative terms, is increasing.

It is therefore likely that the current incompatibility issues raised in this paper will persist for some time. Both asymmetry in injury risk and overall risk should be monitored in 4WD/LT-to-car crashes, to ensure that risks arising from incompatibility are reduced as far as is practicably possible.

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Victorian family day care scheme providers' knowledge of child restraint best practice

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Abstract

In Victoria nearly half of the population under 12 years of age uses family day care services. Providers of family day care services are in a position to provide important information on the best practice of child transportation to family day care educators, and families accessing family day care. Our study, conducted in November 2011, aimed to investigate family day care service providers' level of knowledge of best practice for transporting children in cars. A sample of Family Day Care Victoria service providers (n=48) completed a survey on child restraint knowledge, practices and attitudes. Of the providers surveyed, 98% stated that they knew the law regarding child restraint usage. A high proportion offered professional and practical support (92%) as well as educational resources (94%) to family day care educators with regards to safe transportation. However, when asked to provide the minimum age at which children are able to use a specific restraint type only 81% correctly identified the minimum age for booster seats, 75% for forward-facing restraints, 40% for the front seat, and 58% for adult seat belts. These results indicate that more effort is required to support family day care services, which are required to ensure that transport is suitable and safe for all children. Family day

care services act as information conduits to families with young children, and additionally educate and train family day care educators travelling daily with young children in their charge. This would ensure all children are provided optimal levels of protection whenever they travel in cars.

Keywords

Child care, Child restraints, Education

Introduction

In Australia, car crashes have consistently been identified as a leading cause of preventable injury and fatality in children [1, 2]. In Victoria, approximately half of all child fatalities due to unintentional injury are transport related, with 103 children fatally injured in transport related incidents between 2003 and 2005 [3]. Australia wide, approximately 70 children die each year as motor vehicle occupants, and many more are seriously injured [4].

Injury among restrained child passengers is largely due to suboptimal restraint practices. Suboptimal restraint occurs when a child inappropriately uses a restraint

system designed for older occupants and/or uses the restraint incorrectly. In a 2009 population referenced New South Wales (NSW) study of restraint use, only 25% of children were found to be optimally restrained, 52% were appropriately restrained, and 62% were using the restraint correctly [5]. This aligns with results from a 2006 Victorian study that also reported low levels of self-reported appropriate use [6].

In a study of children aged 2-8 years following a car crash, children that were optimally restrained suffered no fatal or serious injuries, as compared to sub-optimally restrained children, of whom 30% were seriously or fatally injured [7, 8]. Intervention strategies aimed at reducing child injury and deaths, following motor vehicle incidents, are now increasingly targeting an improvement in the rates of optimal restraint use.

Victorian legislation, as of 9 November 2009, requires the use of a dedicated child restraint for children up to 7 years of age [9]. Additionally, the legislation specifies that a rear facing restraint is mandatory up to a minimum age of 6 months, a forward facing restraint until the age of 4 years, and a booster seat is to be used up to the minimum age of 7 years [10].

Inappropriate restraint use occurs despite attempts at providing parents with clear and concise information regarding restraint transitions. Glanvill [11] found that parents lacked knowledge of correct child restraint use, and many did not understand the risk of inappropriate use. Overcoming this barrier is of paramount importance as parental knowledge of restraint transition ages has been correlated with appropriate restraint use [12].

Child care services have successfully been used as locations to conduct several child restraint interventions aimed at educating parents on correct and appropriate child restraint usage [13, 14]. Child care services provide a convenient means to gain access to parents of children still using child restraint systems.

It has been demonstrated that educating family day care educators on child restraint practices leads to an increased likelihood that parents will receive child restraint information, speak with staff about booster seats, and that they'd consider restraint fit when deciding to transition a child to a seat belt [15]. In line with these findings, Powell [16] found that 59.9% of parents see child care services as a source for information on child rearing.

Family day care is defined by the Department of Education, Employment and Workplace Relations (DEEWR) [17] as "a network of experienced caregivers who provide care and development activities for other peoples young children in the caregiver's own home." Family day care providers

are responsible for training educators, and supplying the resources necessary for them to maintain currency with regards to child safety developments, including child restraint use. Family day care services cater for children up to the age of 12 years.

In Australia, 48% of children under the age of 11 years old use child care services [18]. Interestingly, in Victoria only 22.8% of children under the age of 12 make use of approved child care services with family day care services accounting for 2.91% of all children in Victoria [17].

To the authors' knowledge there have been no Australian studies examining child restraint practices, nor child restraint knowledge in a family day care setting, yet family day care services may play an important and active role in relaying crucial information to parents regarding child safety. Furthermore, unlike educators in child care settings, family day care educators are likely to frequently transport the children in their care in cars.

The providers of family day care schemes administer and coordinate the operations of family day care educators. This includes; monitoring the wellbeing, learning and progress of the children within the service; assuring that all educators comply with required legislative standards for health and safety; and acting as information sources for both educators and families regarding relevant updates. More recently (2012) the National Quality Framework has introduced increased requirements relating to the family day care service providers responsibility in ensuring that transport is suitable and safe for all children.

Given the responsibility family day care service providers possess as information sources, and the serious potential consequences of sub-optimal restraint use, this study aimed to evaluate providers' knowledge of child restraints. We also examined the means with which information is passed between providers, educators and families regarding correct restraint use and best practice.

Methods

A self-report questionnaire was distributed to all providers of Family Day Care Victoria. The survey was made available for completion online (designed utilising UNSW's KeySurvey software), as well as in a hard copy format. A list of providers was supplied by VicRoads including the contact details and mailing addresses of each family day care service, and all providers were invited to complete the survey.

Initial contact was established by email, utilising the contact details provided by VicRoads. Follow up calls were made to invite those providers who had yet to respond to the initial email. Reminder emails were then sent to

providers twice following initial contact. Providers who chose not to participate were asked about their reasons for not participating.

The questionnaire took approximately 20 minutes to complete and comprised of 40 closed response questions and one open response question. Information was gathered relating to the number of families, children, and employees attending each family day care service, and their demographic details.

Questions were also targeted towards identifying the role providers play in training educators, and specifically what information and support they provide to the educators. For example, providers were asked to report what levels of professional and practical support they offered and to detail the educational resources they supplied. Finally, providers were asked to complete a series of questions designed to evaluate their existing child restraint knowledge.

The survey remained open for just over two months in an attempt to reach a maximal number of providers, and was conducted during September-November 2011.

Incentives to complete the study were provided in the form of a raffle draw to win one of three \$100 gift vouchers from a large retail chain.

The data was analysed using descriptive techniques. The proportion of the sample with different levels of education; providing different levels of training, practical support and resources; and, accurate knowledge regarding the minimum age at which various child restraints and the front seat can be used (as defined by the current Victorian legislation) was calculated.

This study was approved by the University of New South Wales Human Resource Ethics Advisory Panel.

Results

A total of 104 family day care service providers were identified in the VicRoads database and invited to participate. Of these, 48 (46.1%) returned surveys, representing close to half of all the providers part of Family Day Care Victoria. Where a reason for non-participation was provided, the primary reasons given were uncertainty regarding the legality of sharing family day care service information with the researchers, and high workloads restricting the time needed to complete the questionnaire. Note that only approximately 50% of non-participating providers gave reasons for non-participation.

In total, the 48 family day care services employed 1,552 educators, for an average of 32.3 educators per service; 9,965 families made use of the services, and 13,945

children attended the family day care service surveyed. There was an average of 212.0 families, and 303.2 children per family day care service. These values are likely to be an underestimate as several providers mentioned that a significant number of children were not permanently enrolled in family day care, and instead made use of its services on a casual basis according to parental need.

Nearly half (45.0%, n=698) of the educators, and 24.3% (n=2426) of the families were identified as speaking a language other than English at home.

Participants were asked whether they provided support to the educators in their family day care service with respect to the safe transportation of children in cars. Three categories were presented including professional support (e.g. training, education), practical support (e.g. materials, restraints), and educational resources. 92% (n=44) of providers stated that they supplied professional support, and in 71% of cases this support was provided in the form of mandatory staff training. Similarly, 92% (n=44) offered practical support, and 94% (n=45) gave out educational resources relating to the safe transportation of children in cars.

Providers were questioned regarding whether they themselves, the educators, and/or the families supplied the child restraints and booster seats for children attending their family day care service. Of the providers surveyed 79% (n=38) stated that they provided the restraints, 67% (n=32) indicated the educators supplied them, and 21% (n=10) identified the family as responsible for the child restraints -N.B. 56% (n=27) of respondents reported the supply of child restraints by more than one source, hence the above adds to greater than 100%. When these results were combined to examine how many children obtained their restraints from family day care (whether from the educators or the providers) it was found that 98% (n=47) of the services bore the responsibility for providing appropriate restraints to the children in their care.

When asked about their knowledge of the laws covering how children should travel in cars 98% (n=47) affirmed that they knew the laws. A follow-up question asked that they write the minimum age at which children are able to use forward-facing restraints, booster seats, adult seat belts, and the front seat. The number of accurate responses for the forward-facing restraint and booster seat were 75% (n=36) and 81% (n=39) respectively. Knowledge of the minimum age for adult seat belt use was lower with only 58% (n=28) giving accurate responses. The minimum age for front seat use seems to be the most unclear with only 40% (n=19) of providers correctly identifying the age at which children are able to begin using this seat.

Almost two-thirds (63%, n=30) of providers stated that they had received training or education on best practice in safely

transporting children in motor vehicles. The most common suppliers of training were VicRoads (60%, n=18) followed by restraint fitting organisations (30%, n=9). Of those who had received training, the average time period since the training was a year and 9 months. At the time this survey was administered, these results indicate that 12 (40%) of the respondents who had received training hadn't received it since the Victorian legislation update on 9 November, 2009 [19].

Discussion

The key finding of this study is that knowledge of best practice in transporting children is relatively poor among Victorian family day care service providers. This is particularly concerning given family day care service providers National Quality Framework (NQF) responsibilities and that almost all of the providers surveyed are providing training and practical support to the educators within their schemes, and that the schemes report being responsible for the provision of restraints for the children using the scheme.

The greatest gaps in knowledge among the providers were related to the appropriate transition time to adult seat belts, and the use of the front seat. While more providers were able to confidently identify the minimum age at which a booster seat and a forward-facing restraint can be used, these numbers were less than 100% (81% and 75% respectively), and are also relatively low given the mandatory nature of the use of restraints by children within specific age ranges.

These results are similar to those reported in a Canadian study of paediatricians' knowledge of recommended child restraint transition points. The Canadian study also found that a larger proportion of paediatricians correctly identified when a booster seat and forward-facing restraint ought to be used (63% and 92% respectively), however only 33% were able to accurately state when a seat belt should be transitioned to [20]. This suggests health professionals, like the family day care providers, have better levels of knowledge around best practice for the youngest children.

The gaps of knowledge identified are probably not surprising given the low proportion of providers reported to have received training since the introduction of the new laws. These results demonstrate that more effort is required to educate the providers to clarify the age at which children are able to transition between restraints. Furthermore, the observed length of time since the most recent provider child restraint training or education session indicates that there is room for improving knowledge and maintaining currency on any child restraint safety developments.

A National Quality Framework (introduced from 1st January 2012) has been implemented across Australia to improve the quality of education and care in early childhood education and care facilities. A facet of this initiative is the introduction of a day care rating system based on seven quality areas, including "Children's Health and Safety" of which transport safety is a subset [21].

The rating system aims to motivate services to keep current on quality improvements, and give families better information with which to evaluate day care facilities including family day care. The NQF also describes the possibility of supplying increased support to facilities with poor or unsatisfactory performance. The results of this study suggest there is a need for increased support of family day care services in terms of the provision of training in best practice child occupant safety. The NQF may provide a mechanism for identifying those services with greatest need.

The results also demonstrate the potential wide reach family day services have in providing support and information to families regarding best practice in transporting children. The numbers observed in this survey indicate that more than 20,000 families could be reached through Family Day Care Victoria alone. Identifying potential conduits for providing detailed information about best practice in transporting children is important because we know that legislation alone cannot be relied upon to improve rates of appropriate usage [22]. Meta-analyses of intervention effectiveness have demonstrated that the most successful approaches are those that combine legislation, education, incentive and distribution programs [23, 24]. By identifying problem areas through the NQF rating system, and directing resources appropriately, family day care services may provide an opportunity to target interventions towards those parents in greatest need.

However, it is critical that information supplied through such networks is correct, and currently it appears possible that messages being communicated through the family day care network may not be in line with current best practice. This may make it difficult for family day care service providers to meet the requirements of the NQF.

The need for additional education and support beyond the legislation to encourage optimal practices is particularly important in the more vulnerable sectors of the community i.e. lower socioeconomic communities and culturally and linguistically diverse (CALD) communities. Interestingly this survey suggests a relatively high proportion of educators within family day services may be from CALD communities with nearly half reportedly speaking a language other than English at home.

Finally, we found the providers to be receptive for the most part in assisting the researchers with this study. Many providers expressed agreement that more had to be done to improve appropriate child restraint and frustration that despite their efforts parents continued to improperly restrain their children. These findings are promising as they imply that interventions aimed at improving provider knowledge through training and education programs may be met with a high level of interest.

Limitations

Efforts were made to contact all providers in order to achieve a census sample, however only 48% agreed to participate. No data was available from the non-responders so it is not possible to know how well the sample might represent all providers associated with Family Day Care Victoria. For this reason, the results presented here cannot be extrapolated to all Family Day Care providers.

Further Research

Further research is needed to clarify the role providers play in dispensing appropriate child restraint use information to the educators of the children attending the family day care services, and what the current level of knowledge and practices being used by educators and families using family day care services are. Further surveys are currently under way to establish these profiles.

Conclusion

This study demonstrates that most family day care service providers do provide education, practical support and educational resources to their educators about how to safely transport children. However, the results indicate that the current level of information about best practice in safely transporting children among family day care service providers needs to be improved. To assist family day care services in meeting the National Quality Framework responsibilities there is a need to implement processes to ensure family day care guidelines and providers maintain currency in child safety legislature and best practice.

Acknowledgements

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Contributed articles

L2P – learner driver mentor program: extending driver licensing reach in disadvantaged communities

by C J Freethy

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Introduction

In 2007 Victoria introduced a new Graduated Licensing System (GLS) to improve young driver safety. Provisions included a 12 month minimum holding period for under 21 year olds and a requirement for this cohort to gain 120 hours on road experience prior to taking a probationary licence test. A two-stage, four year probationary licence was also introduced. The GLS was expected to reduce Victorian young driver injuries by up to 800 per year, and result in 12 fewer deaths.

The L2P – learner driver mentor program was initiated as a result of the newly-introduced 120 hours on road experience requirement. It was recognised that while most learners would be able to gain 120 hours experience, some community members would struggle because they lacked a vehicle, a supervising driver or the means to purchase paid instruction.

VicRoads identified that approximately 3,000 young people per year would have difficulty accessing a vehicle or supervising driver, and developed potential policy

responses. Through this work pilots were established to trial a volunteer mentor scheme, in which fully licensed community members provided supervised driving experience to young people disadvantaged by the on road experience requirements. The Victorian Government subsequently determined it would provide \$9 million funding through the Transport Accident Commission to establish the L2P - learner driver mentor program.

Objectives

There are two primary L2P objectives:

- Improved road safety through compliance with the GLS requirements.
- Equal opportunity for young Victorians to obtain a driver licence.

In establishing a volunteer mentoring program, VicRoads recognised the potential benefits of L2P extended beyond road safety and driver licensing. As a result, three secondary L2P objectives were identified:

- Improved access to employment opportunities;
- Enhanced mobility; and
- Opportunities for increased social connection.

The secondary objectives are particularly salient for rural, culturally and linguistically diverse (CALD) and indigenous communities, where lack of a driver's licence can cause particular hardship.

Model

The L2P model is a community-based volunteer mentor program, built from the pilot projects established while the GLS was in development. L2P provides learner driving practice in an ANCAP four or five star car under the supervision of a fully licensed driver. There are a number of reasons for the use of volunteers:

- Experience on road makes the critical difference to road safety outcomes for young people, rather than teaching or instruction.
- Professional driving lessons would be very expensive for government to fund.
- Volunteerism develops new skills, enhances social connection, personal satisfaction and a sense of wellbeing for the volunteers.
- Being mentored delivers on road experience, but extends to providing a stable adult role model, opportunity for stronger social connection, confidence, goal direction and importantly improved road safety attitudes and behaviour

The funding model structures in community engagement and sustainability through requiring the formation of broad based Steering Committees, a partnership approach to working with local government and community service organisations and local community ownership through sponsorship, donations and in kind contributions. Local government is the principal auspice body for L2P programs, and councils work with community agencies, government bodies, police, local businesses and other stakeholders to run L2P programs. Local government operates or sub-contracts the program, with each program having an L2P Coordinator to manage implementation and delivery.

VicRoads funding covers L2P Coordinator salaries and some operating costs. The remaining costs are covered by in kind contributions, donations and sponsorships sourced by L2P programs and Steering Committees.

Supervising drivers register as volunteers with the L2P provider and undergo police, Working with Children and driver licence checks. They receive 10 hours training

designed by VicRoads and delivered by a TAFE provider. The training program resources volunteers on young driver issues, how to work with disadvantaged young people, key road rules and conducting supervised driving sessions according to the four stage approach to learning to drive outlined in the VicRoads Learner Kit.

Learners are assessed for eligibility by L2P Coordinators before acceptance into the program. They receive up to 7 lessons from driving instructors, initially to ensure they are safe on road and ready for mentoring, and subsequently to assess progress or troubleshoot issues.

Reach

To date VicRoads has funded 55 programs spanning 60 of Victoria's 78 local government areas, or three quarters of the state. All have launched and are operational. Although initial funding for the L2P program was due to cease progressively from February 2012, the Victorian Government announced in February that it would fund L2P for a further three years commencing 1 July 2012.

The total capacity of the L2P program is 1,800 young people per annum. Given that young people enter and leave the program for a range of reasons, working capacity is estimated to be 1,500 to 1,600 people actively engaged in on road driving experience.

The trained volunteer mentor target is 1,800, to allow 1:1 matching with learners plus additional capacity to cover leave, illness and departure of mentors. Capacity will be achieved in 2012.

To 30 June 2012 the program delivered approximately 72,000 hours of on road experience and 500 probationary licences. In the June quarter 12,000 driving hours were delivered and 84 licences. These figures are increasing as all programs build capacity.

There were 1,400 active learners and another 700 waiting to start driving. Over 1,100 mentors were trained and actively supervising learners, with 500 waiting to be matched. Many mentors supervise more than one learner, and take on a new learner when their current match leaves the program. Learner turnover for the quarter was 13%, mentor turnover 1%.

Focused L2P Programs

While all L2P programs accept only young people who can demonstrate disadvantage with respect to gaining a driver licence through the GLS process, a number of programs further specialise in particular areas of need.

Two programs assist metropolitan Department of Human Services clients in the youth justice and supported accommodation systems. These young people have often experienced severe long term disadvantage, have offended or are at risk of offending, have high risk of crash involvement, have limited community support at best and in the case of young people in supported accommodation are in transition to independent living.

In comparison with other L2P programs, intensive individual work is required to engage and prepare these young people for L2P since they have many experiences of failure and may be unused to the regular long term commitment required to benefit from L2P. These participants often also have issues accessing identity documents and therefore gaining a learner permit in order to participate in the program.

L2P has proven very successful for this client group. Once engaged, they often accumulate on road experience very quickly, and Departmental officers report that participants have successfully left care, engaging with education and employment. The Department of Human Services views L2P as highly normalising for its clients, and one of the most positive experiences they have whilst in state care.

The Wellington and East Gippsland Shires L2P program focuses on local indigenous communities. There is clear demonstrated need in the area and strong local support for the program. It is conducted by Mission Australia, which has extensive networks and is also very effective at obtaining sponsorship and donations. The program is managed by a highly visible and respected Aboriginal elder.

Mission Australia also conducts the Ignition learner permit program and the Aboriginal Driver Education Program. These programs leverage each other and contribute to an integrated approach to driver licensing for indigenous communities. People on low incomes, with a disability or other disadvantage are also eligible.

The availability of these programs enhances L2P by encompassing legal support and assistance with identity issues; literacy, numeracy, IT and financial management training; car ownership and maintenance education; traffic law and road safety education; financial support; and linkages to health, employment, training and community participation services.

While all programs are expected to cater for local community need and a number of programs are located in areas with high cultural diversity, one L2P program focuses primarily on CALD communities. This program is managed by the Southern Ethnic Advisory and Advocacy Council in Melbourne. It has been strongly subscribed and can boast successes across a range of cultural groups, including

more recently arrived African communities. The agency's strong connections and expertise with culturally diverse communities are key drivers of this success, aided by an excellent coordinator.

On average, 10% of L2P participants are from CALD or indigenous backgrounds. The success of L2P in addressing the needs of diverse communities referred to above is replicated in programs across Victoria, with each program seeking to identify and engage those young people most in need.

L2P has an entry cut-off of 21 years of age, because from this age Victorian learners are not required to gain 120 hours on road experience. Older disadvantaged learners, particularly those from migrant and refugee communities, may still struggle to gain a driver licence due to limited access to on road experience or challenges in negotiating the licensing system.

The Transport Accident Commission has previously provided funding for organisations such as Adult Migrant Education Services to develop programs based on the L2P model for older learners. These initiatives are now being replaced with a partnership between the Transport Accident Commission and the RACV, to deliver the RACV New Arrivals Road Safety Program. This program provides limited funds to access driving lessons, road safety seminars or volunteer mentor training.

Learnings and Evaluation

As a program in operation since late 2008, there are a number of key learnings from establishing a statewide learner driver mentor program that can be applied in other settings.

Setup

A key learning from establishing 55 L2P programs is that local communities require considerable setup time. L2P providers are given 6 months from initial funding to establish the program and have learners on road. This is in recognition that the formation of partnerships, program development, recruiting and training volunteers, engaging learners, seeking sponsorships and vehicles, and a range of other establishment tasks are time consuming. A significant amount of pre-work to establish the need for an L2P program is also necessary. Implementation support is therefore a critical success factor, and VicRoads provides Field Support staff who travel across the state to ensure L2P programs establish and operate successfully.

Operating Model

There is no set formula for a successful L2P operating agency. Smaller agencies experienced in working with volunteers or young people have clear strengths in these areas, but may have limited management or administrative resources. Local government usually has a robust resource base but may not always have functions within which L2P is a natural fit. Some providers possess strengths and conduct activities that complement L2P extremely well.

Across 55 L2P programs there are numerous variations in operating models, strengths and limitations. The common element is that the partnership approach strengthens L2P development, implementation and operation. Engagement of key community stakeholders brings a range of resources and expertise to L2P programs, maximising the strengths of providers and bringing solutions to address any challenges and limitations. L2P would have been less successful without this high level of local community engagement.

In some cases Steering Committees have struggled to maintain energy and attendance once funding has been granted and the program established, as this was the main focus. It is important to proactively manage these issues, re-focusing the committee on operational support and if necessary revising Committee membership.

Training

The VicRoads designed 10 hour volunteer mentor training course is also a critical element of the L2P program. It covers road safety content, mentoring issues, skills acquisition and an on road coaching component. The training provides an opportunity to deliver key young driver road safety messages, the four stage model for learning to drive, mentoring and coaching skills and the capacity to assess suitability of trainees to become volunteer mentors with the program. Volunteers report a significant increase in confidence in the supervising driver role as a result of the training.

Program Options

Although the L2P program is designed to operate within a particular framework and funding environment, there is capacity to apply the fundamental principles to different situations provided program design is appropriately modified. While partner buy in and support is essential regardless of model, funding levels, coverage and the nature and extent of support are potentially all amenable to alternative approaches.

While an extensive statewide program is unlikely to be sustainable with seed funding, a program targeting specific

local areas potentially is. Given the early pilots for L2P focused on a voluntary program operated by a Rotary Club and an initiative by one council, there is scope to tailor learner driver mentor programs to suit available funding and local support.

Another lower cost alternative is to publish materials on the web for local groups to use in establishing and running a volunteer mentor driving program.

Funding a training component plus other selected resources is another potential limited cost approach.

The level of funding applied to each program component is another policy decision. VicRoads pays for local coordinator salaries and a share of running costs, but not vehicles or equipment. This could be reconfigured to suit differing requirements.

Particular ages, cultural groups, areas of highest transport disadvantage and so on can be targeted and this might be the most appropriate way to manage limited resources.

Funding driving lessons is likely to prove a considerably more expensive alternative than a volunteer mentor program, and lacks the community benefits that accrue from a mentoring program. Funding limited lessons for specific purposes may have some benefits. As noted above, the L2P program funds a limited number of professional instructor hours to ensure new participants are safe to be placed with volunteers on the road network, to periodically check progress and to troubleshoot particular issues.

Providing increased exemptions from the required number of on road hours is a low cost option, but is difficult to support since it accepts a lower standard of safety for some novice drivers.

These alternatives are likely to constrain program reach, and risk management in all cases remains a significant challenge.

Evaluation

A qualitative evaluation was completed in late 2010, utilising information collected from a small number of steering committees, coordinators, volunteers and learners. This evaluation indicated:

- Young people in the program experienced a range of disadvantage and came from diverse backgrounds.
- They reported prior unlicensed and unsafe driving practices, which had ceased since starting L2P.
- Road safety attitudes and behaviours had also improved.

- Mentors come from a range of backgrounds and have varied motivations.
- All stakeholders felt there were very positive outcomes across road safety, self esteem, life skills and goal direction.
- The partnership model, one-to-one mentoring, coordinator support, vehicle accessibility and community goodwill all contribute to the program's success.

Conclusion

The L2P – learner driver mentor program has gained very high community acceptance, with take-up spanning 60 local government areas across Victoria. A number of additional local government areas have indicated they would access L2P if funds were available.

The partnership approach between government, community and local businesses is a key strength of the L2P program. It has fostered community acceptance and commitment to L2P, ensured broad reach and provided valuable support for the establishment and ongoing operation of local L2P programs.

L2P is providing opportunities for learner practice and licensing, but has other benefits for disadvantaged community members including improved road safety, social and employment outcomes.

The L2P model is adaptable across a range of community groups, and works well if key success factors are present.

Acknowledgements

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Warren Harrison also played a key role in the development of the program and training models.

The 'Yalgoo Experience': applying the safe system approach in a remote setting.

By R Gibson¹ and P Vince²

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Introduction

Local governments are important players in road safety as road transport system designers, operators and managers. Local governments are well positioned to positively influence road safety outcomes as leaders and influencers in their local communities. *Towards Zero*, the WA road safety strategy 2008-2020, recognises the part local governments play in the shared responsibility approach to road safety [1].

The Shire of Yalgoo is one of 141 local governments in Western Australia, located in the Mid-west region approximately 524 km north-east of Perth. The Shire of Yalgoo is a small remote local government covering an area of 33,528 km with a population of 242. The shire is responsible for design, operation and management of 115km of sealed roads and 1,126 km of unsealed roads [2].

In the period from 1995-2004 non-metropolitan Western Australia recorded 7,876 serious injury crashes including 22 serious injury crashes in the Shire of Yalgoo. The Midwest Region in which the shire of Yalgoo is located is over represented in the KSI rate with 180.8 people killed and seriously injured per 100,000 population compared to the state average of 134.4 people killed and seriously injured per 100,000 population [3].

The Western Australian road network ranks as one of the worst in the country in terms of deaths per 100,000 population with 8.7 deaths per 100,000 compared to the Australian average of 6 deaths per 100,000 population. Non-metropolitan Western Australia is significantly worse than the rest of Australia with over 20 deaths per 100,000 population (Figure 1). *Towards Zero*, the WA road safety strategy 2008-2020, recognises that we should not accept any death or serious injuries on our roads and aspires to a

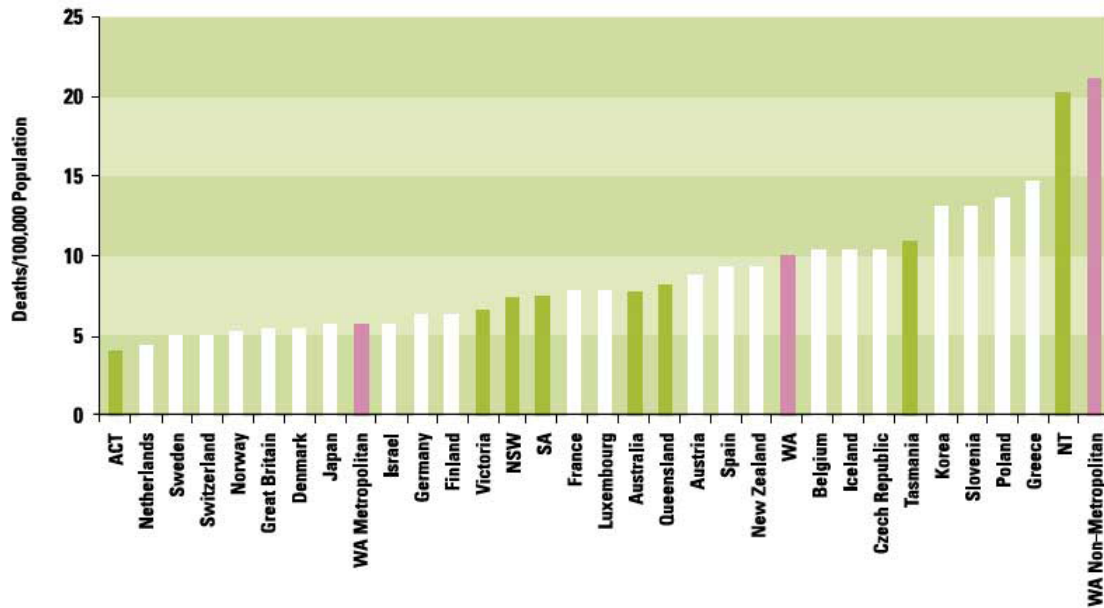


Figure 1: WA deaths per 100,000 population in comparison to other jurisdictions [1]

long term vision of a road transport system where crashes resulting in death or serious injury are virtually eliminated [1].

Towards Zero is underpinned by the safe system approach to road safety. In creating a Safe System we recognise it is perhaps not possible to eliminate all crashes, but instead we should aim to prevent crashes that result in death and serious injury. The Safe System recognises that we make errors and we need to build a road transport system that allows for human fallibility and people simply making mistakes. Taking a holistic view of the road transport system the safe system approach looks at the interactions between travel speeds, roads and roadsides, vehicles and road users. The Safe System uses a shared responsibility approach in that everyone is responsible for road safety [1].

Method

The Shire of Yalgoo identified an issue regarding pedestrian safety on the Geraldton Mount Magnet Road, which passes through Yalgoo. The road is controlled by Main Roads Western Australia and is used by a number of heavy haulage operators servicing mine sites east of Yalgoo.

A meeting of relevant stakeholders and community members was called by the Shire of Yalgoo on 6 October 2010 to discuss the issue and identify collective actions to be commenced by the appropriate stakeholder. Prior to the meeting the Shire of Yalgoo had a strong relationship with heavy haulage companies, state government agencies and mining companies with operations east of Yalgoo. These strong relationships and a positive community attitude

towards road safety issues in the shire of Yalgoo was a key to the positive and proactive approach taken in addressing the road safety issues identified.

The meeting followed the OLA approach, which was developed in Sweden. The OLA approach encourages all parties to provide objective data from their area of expertise, jointly work as a team to *list the opportunities* to overcome the concern, and then develop an *action, responsibilities and timeline plan* and implement to deliver the required road safety outcomes. A key to the success of the OLA approach is strong community and stakeholder participation, which was the case in Yalgoo.

During this process the stakeholders were presented with objective data from Main Roads, WALGA RoadWise Program, Shire of Yalgoo and heavy haulage companies. The objective data presented outlined the *Towards Zero* strategy and the safe system approach to road safety specifically focusing on human fallibility (i.e. there are physical limits to the amount of force our bodies can take before we are injured), creating a road transport system that protects road users from violent forces and safe speeds for conflicts between road users. Table 1 outlines safe speeds for conflicts between road users.

Main Roads WA presented the meeting with information on speed limit setting, road design and possible safe roads and roadside solutions that can be used in remote areas. Main Roads WA controls all speed limits setting in Western Australia and has a specific policy in regard to setting speed limits in WA.

Table 1. Safe speed thresholds for different types [1]

Road type	Safe speed (km/hour)
Possible conflict between cars and unprotected users	30
Possible side-on conflict between cars	50
Possible frontal conflict between cars	70
No possible frontal or side-on conflict between road users	≥100

The Shire of Yalgoo outlined the actions that had been taken so far, a background to the issue for the relevant stakeholders and previous consultation with relevant stakeholders to bring all parties up to speed with the current status of the issue. The heavy haulage companies also outlined actions that have already been taken to address community concerns regarding the issue of pedestrian safety in the township of Yalgoo. These actions included the heavy haulage companies implementing a speed limit of 60km/h for all of their vehicles through the township of Yalgoo, conducting road safety education with the children at Yalgoo Primary School and controlling the release of heavy vehicles from port and mine sites to have 30 minute gaps between vehicles.

Following the presentation of objective data to the stakeholders and community a list of opportunities to address the issue was created by the meeting. The list was discussed and reviewed as to what is realistically possible and what needed to be delivered to ensure the required road safety outcomes were achieved. These actions were then noted and distributed to all stakeholders and the Yalgoo community to progress. The action, responsibilities and timeline plan provided a framework to address the pedestrian safety issue on the Geraldton Mount Magnet Road.

Results

Pedestrian safety in the shire of Yalgoo has been progressed by stakeholder and community participation in addressing the issue and agreeing to implement or investigate a number of actions. Since the meeting a number of developments have occurred and many of the actions outlined have been completed.

The majority of actions identified in the actions, responsibilities and timeline plan (summarised in Table 2) have been completed or have been progressed by the relevant stakeholder. The distribution of a contact list for heavy haulage companies to report any dangerous driving and/or offensive language and behaviour has been completed by the Shire of Yalgoo. The WALGA RoadWise program has provided information to the Shire of Yalgoo regarding the acquisition of a speed display trailer from the community road safety grants program as well as assistance

in completing the grant application. The grant application is still in the process of being completed and Crosslands resources have hired a speed display trailer for the Shire of Yalgoo to use.

A pedestrian maze and signage at the intersection of Geraldton Mount Magnet road and Gibbons Street has been added to the forward capital works plan by the Shire of Yalgoo. The pedestrian maze has been budgeted for the 2011-2012 capital works program subject to main roads approval. An upgrade to Gibbons Street has also been included in the Shire of Yalgoo's forward capital works plan, which includes the provision of footpaths on all side streets leading to Gibbons Street. Main Roads WA have installed rumble strips on the entry and exit to the township of Yalgoo on the Geraldton Mount Magnet road as an audible warning to alert drivers of the township. Main Road WA has also improved the delineation of the road by line marking the edge of the road and line marking double white lines down the centre of the Geraldton Mount Magnet Road within the town boundaries.

Road safety articles are included each month in the Yalgoo "Bulldust" newsletter to remind the community of the importance of road safety. School Drug Education and Road Aware (SDERA) have been working closely with the Yalgoo primary school in relation to road safety and have run the Challenges and Choices program, living with heavy vehicles program and Smart Steps program with the school.

The Yalgoo community and relevant stakeholders have committed to improving road safety in the Shire of Yalgoo and will continue to work together in addressing pedestrian safety on the Geraldton Mount Magnet Road through the Shire of Yalgoo.

Discussion

Towards Zero provides a framework for improving road safety within Western Australia and outlines a number of specific initiatives to be implemented in regional and remote Western Australia under each of the four cornerstones. Specific initiatives outlined under the safe roads and roadsides cornerstone include lighting and path definition around indigenous communities and separation of pedestrians from traffic in remote areas. Under the safe

Table 2: Summary of Actions

What	Why/Comment	Cornerstone	Who (agency)	Time frame	Status
Prepare & distribute a list of 24 hour contacts for haulage companies	For complaints about dangerous driving and/or offensive language/behaviour	Safe Road Use Safe Vehicles	<ul style="list-style-type: none"> Haulage Companies to email contact details to pa@yalgoo.wa.gov.au Shire to Prepare & distribute list 	Short Term	Completed
Put road safety articles in Bulldust(Shire of Yalgoo newsletter)	Email articles to Shire pa@yalgoo.wa.gov.au	All cornerstones	All agencies	ongoing	Ongoing
Model safe behaviours such as using the footpath	Children learning through repetition and observation	Safe road use	Community	ongoing	Ongoing
Educate children about road safety	E.g.: walking school bus, use of traffic course opposite school, road-train visits	Safe road Use	School Haulage Companies	Ongoing	Ongoing
Obtain a Speed Display trailer	Ruth Burmeister indicated that she is preparing a funding submission to the WALGA RoadWise program for child car restraints and could include the speed display trailer	Safe Speeds	Centacare to add speed display trailer to submission WALGA RoadWise Program to assist with grant submission	Short Term	Grant application currently in development with the assistance from the WALGA RoadWise Program
Audit Signage on town approaches and replace signage as required	Ensure signs are modern and clearly visible to drivers (some are old and due for replacement)	Safe roads and roadsides	Main Roads	Medium Term	
Double white lines on Geraldton Mt Magnet Rd through Yalgoo	Address the issue of overtaking through town when vehicles are slowing down	Safe Roads and roadsides	Main roads	Medium Term	
Edge Lining on Geraldton Mt magnet road through Yalgoo	Give better visual delineation of road edge to drivers and pedestrians	Safe Roads and roadsides	Main Roads	Medium Term	
Install rumble strips on town approaches	Calm traffic speeds and alert motorists of the town area	Safe Roads and Roadsides	Main roads	Medium term	Completed
Monitor Speeding Traffic	Drivers have been seen speeding through Yalgoo particularly in the morning and around 4-630pm, community to report to police	Safe Speeds Safe road Use	Police Community	Ongoing	Ongoing – police perform regular enforcement in & around the Yalgoo
Apply for funding to introduce footpaths consistently in Yalgoo particularly main roads (Gibbons Street, Henty Street)	Improve pedestrian safety by keeping pedestrians off the road	Safe Road Use	Shire	Medium term	
Events traffic Management – applications to Main roads for reduce speed during events	Reduce speed of through traffic when there are specific events such as gymkhana and races	Safe Speeds	Shire	As Required	
Install pedestrian maze at intersection of gibbons St and Geraldton Mount Magnet Road, consider additional treatments such as lighting, fencing and pedestrian island	Better separation of pedestrians from vehicle traffic when crossing, visual warning to drivers of pedestrian presence	Safe roads and roadsides	Shire	Long Term	Budgeted in Shire of Yalgoo's forward works plan for 2011/2012 financial year
Major long term project to install lighting and median strip as part of gibbons Street Beautification project	Work towards achieving reduction of speed through Yalgoo and increased pedestrian safety	Safe Roads and Roadsides	Shire	Long Term	Added to Shire of Yalgoo's Works Plan – currently un budgeted
Youth Centre	Creating a safe place for children to play		Shire	Long Term	Liaison with appropriate stakeholders to develop

speeds cornerstone, fine tuning of speed limits in and around remote centres is outlined as a specific initiative for regional and remote areas. The incorporation of these specific initiatives as well as the initiatives outlined for all of Western Australia in *Towards Zero* into the actions, responsibilities and timeline plan from the meeting in Yalgoo demonstrate that the safe system approach can be applied to a remote setting [1].

Overall the approach to pedestrian safety in the township of Yalgoo was a positive step in the right direction however the process and approach used can always be improved. The information provide to the meeting by relevant stakeholders was relevant but not comprehensive. A holistic approach to removing death and serious injury on the Shire of Yalgoo road network would take into consideration all crash types. Pedestrian safety within the Shire of Yalgoo is a minor issue and an in depth analysis shows single vehicle run-off-road crashes to be the main cause of serious injury and death.

A longer lead time would allow for the preparation of a comprehensive objective data set to provide a detailed background of the issue. For example, a road safety audit could have been conducted on the road section which would have assisted in identifying a number of technical issues. A stronger explanation of the safe system approach would also have added value and improved the outcomes from the meeting. One other consideration is the inclusion of a number of other agencies and community members to strengthen the community and agency support for action on the issue.

The actions in the meeting highlight short, medium, long term and ongoing actions which provide a framework to improve pedestrian safety in the shire of Yalgoo. The framework is aligned to *Towards Zero*, and will be actioned over a number of years. Due to the long term actions outlined the success of the framework will not be known for some time but many of the short term actions on the framework have already been actioned. Community involvement and support has been a key factor in the process to date and the high level of community and agency participation shows a shared responsibility for road safety in the Shire of Yalgoo.

Conclusion

The use of the OLA Process has highlighted that the safe system approach to road safety can be applied in a remote setting. Key to the success of any road safety initiatives in remote areas is community and agency participation as well as strong leadership from one agency (in this case the Shire of Yalgoo).

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The Advantages of the National Road Safety Council as an Independent National Body promoting road safety in Australia

by RFS Job and R Cook

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Abstract

In Australia, the accountability for, and management of, road safety rests almost entirely with the states and territories. In order to promote road safety more effectively and nationally, the jurisdictions work together in several ways, including the National Road Safety Executive Group, and the creation of National Road Safety Strategies each covering periods of a decade. Critical national advocacy

groups already exist, including the Australasian College of Road Safety, ANCAP, and the Australian Automobile Association (AAA). In addition, the states, territories, and Commonwealth Governments agreed to create the National Road Safety Council (NRSC), an independent body working at the national level for road safety, but with funding from all the jurisdictions. This paper identifies advantages of this body in advancing road safety, and considers the best ways for the NRSC to move forward.

Key advantages of the NRSC include: (1) independence of commentary from Government and credibility as an unbiased advocacy group (unlike the Government experts in each jurisdiction who are often presented in the media as simply defending the Governments position rather than bringing evidence based expertise); (2) independence from the pressure of the views of members (which may sometimes limit the evidence basis of road safety positions of motoring clubs); and (3) the funding base, which while small in comparison with the jurisdictions, is still large compared with other independent voices such as the ACRS. The NRSC has three strategic advantages that it aims to capture: (1) by purchasing materials or processes for national use it captures efficiencies over each state conducting its own purchase process; (2) as an independent voice the NRSC can advocate courageous actions, helping the political process, applying pressure for national uniformity, and encouraging stronger decision making through the knowledge that the other states are doing it and the feeling that ‘I am not alone in this’; (3) the NRSC has sufficient funds to trial some promising programs and conduct key pieces of research. Examples of these are identified from the activities of the NRSC to date, including the funding of materials, advocacy to the media, and the trialling of programs.

Keywords

Indigenous road safety, National Road Safety Strategy, Road safety advocacy, Road safety leadership, Serious injuries, Stakeholder consultation

Introduction

Australia’s achievements in road safety over recent decades continued in 2011; the first year of the National Road Safety Strategy 2011-2020 [1]. 2011 saw a 4.4% reduction in deaths on our roads compared with 2010 - that is a saving of 60 lives. Nonetheless, we can and should be doing better. Australia is ranked 14th of the 27 Organisation for Economic Co-operation and Development (OECD) countries in terms of road traffic deaths per 100,000 population, demonstrating that others are doing significantly better than Australia.

Injuries are also of great importance in road safety. Unfortunately, there is a long lag time in the collection and collation of these data, which are thus not yet available for comment for 2011. While a longer lead time is understandable because of the much larger volume of data, this limits the use of serious injury data in news and advocacy because by the time they are available they are no longer seen as recent or newsworthy.

Unlike the large majority of countries [3], in Australia road safety is managed largely independently by each state or territory rather than being managed nationally. The state or territory governments are held accountable for the toll of death and injury in their jurisdiction, and have the power to create and revise road safety policy independently in their jurisdiction. Thus, significant differences exist in almost every aspect of road safety policy, including separate speed zoning guideline documents, distinct penalty regimens and distinct graduated licensing systems, which vary from requiring 120 hours of learner training before moving to a provisional licence, to 50 hours, to no minimum required hours. Even policy on vehicle inspection and road design requirements are set largely independently within the states. The Commonwealth government sets vehicle standards for safety through the Australian Design Rules (ADRs), although recently a state (Victoria) set vehicle design requirements in excess of the ADRs. These differences exist despite attempts to create national uniformity through various mechanisms including model road laws, which the jurisdictions adopt to varying extents. One task of the National Road Safety Council (NRSC) is to promote and facilitate national action for road safety.

This paper describes the role of the NRSC, its advantages as a road safety advocacy and action group, and outlines its work to date.

The Objective and Composition of the NRSC

The NRSC’s objective is to contribute to the reduction in death and serious injury on Australian roads by facilitating the development and implementation of effective road safety measures.

Our roles are to: heighten awareness of road safety issues; undertake research that assists in improving road safety; raise the profile of road safety with key stakeholders including government, industry, business, academia, and the community; provide appropriate support for road safety activities and events; and assist with the timely implementation of road safety measures set out in the National Road Safety Strategy 2011-2020 [1] and the Global Plan for the Decade of Action for Road Safety 2011-2020 [4].

The NRSC is an independent group of committed people, made up of road safety experts and community leaders appointed by the Australian Transport Council of Ministers (now Standing Council on Transport and Infrastructure: SCOTI). The NRSC first met in 2010. The five Council Members, five Road Safety Ambassadors, and Executive Director are deeply committed to eliminating trauma and loss from road crashes in Australia. The passion and

commitment of members and ambassadors have helped the Council to achieve more in its short life to date.

Advantages of the NRSC

The NRSC has five structural/resource advantages:

1. It is able to offer commentary that is independent of Government, despite the broad Government funding, and indeed its record of public comment (promoting lower speed limits and calling for point-to-point speed cameras) attests to the NRSC's strong use of this independence.
2. The NRSC has credibility as an unbiased advocacy group. It has no more expertise than the Government experts in each jurisdiction, but they have the problem of often being presented in the media, or being seen by the public, as simply defending the Government's position rather than bringing evidence based expertise.
3. Independence from the pressure of the views of a large body of members (an issue for the motoring clubs) or profits (an issue for vehicle manufacturers).
4. Access to and credibility with Governments.
5. Funding base, which while small in comparison with the jurisdictions, is still large compared with other independent voices such as the ACRS.

The NRSC also has three strategic advantages that it aims to capture:

1. By purchasing materials or processes for national use it captures efficiencies over each state conducting its own purchase process.
2. As an independent voice the NRSC can advocate courageous evidence based policy and action, promoting good policy to the community, helping the political process, applying pressure for national uniformity, and encouraging stronger decision making through the knowledge that the other states are doing it and the feeling that 'I am not alone in this.'
3. The NRSC has sufficient funds to trial some promising programs and conduct key pieces of research that may be of national relevance.

The NRSC's program of work to date and planned work reflect the leveraging of these advantages.

NRSC priority areas

The NRSC has chosen six priority areas of focus. These were chosen for the NRSC's capacity to effectively influence within them, as well as their importance to road safety as outlined below for each.

1. Safer speeds

Safe system principles identify speed as a key element to be managed in order to reduce exposure to physical force [2]. This requires revision of speed limits and improved compliance with the speed limits. In official figures, speeding is a major contributing factor in about 34 per cent of Australian road deaths and about 13 per cent of serious injuries, although this is an under-estimate.

2. Alcohol/Drug issues

Australia led the world in introducing random breath testing for alcohol (Victoria was the first state to introduce RBT, and soon after NSW was first to introduce it on a wide scale and show the large benefits). Australia is also a leading country in enforcement of drug driving, through random saliva testing (Victoria was the first state to introduce this testing for marijuana and speed, and NSW was the first to introduce it for marijuana, speed and ecstasy). While these programs work well, we can do better. Alcohol continues to be a major factor in serious crashes with around 30% of all road deaths in 2011 involving a driver over the legal blood alcohol concentration (BAC) limit. Impairment from other drugs adds to this.

3. Fleet safety including heavy vehicles

Fleet safety is about safer vehicles and safer use of them for work purposes. Encouragement and regulation for the manufacture and purchase of safer vehicles have great potential for saving lives and reducing injury in Australia, which has an average vehicle age around 10 years. The risk of death or serious injury in a crash is lower for later model vehicles: the risk in a vehicle made in 2007 is about half that of a vehicle made in 1987. Heavy vehicles are substantially over-represented in fatal crashes, on both per vehicle and per kilometre of travel bases. Many factors contribute to this over-representation: they are an unforgiving object of great momentum in collisions with other vehicles, in addition to behavioural issues of fatigue, speeding, drug use, and failure to wear seat belts.

4. Indigenous road safety

Indigenous Australians are 2.6 times more likely to be killed in a road crash and 1.3 times more likely to suffer a serious traffic-related injury than non-indigenous Australians. Indigenous Australians make up an estimated 5 per cent of road deaths and 3 per cent of serious injuries. Many indigenous Australians also have difficulty legally accessing the road transport system as licensed drivers due to issues of proof of identity, remoteness and access to training.

5. Motorcycle safety

Between 2000 and 2010 the number of motorcyclist deaths increased by 17 per cent, while the rest of the road toll decreased significantly. 2011 went against this trend, with less motorcyclist deaths than in 2010. Nonetheless, in 2011, motorcycle riders made up 15 per cent of deaths, yet motorcycle usage accounts for about one per cent of vehicle-kilometres travelled. Motorcycling activity has grown rapidly.

6. Young driver safety

In 2011, people aged 17–25 years made up 23% of drivers killed on Australia’s roads, but represent only 16% of the adult population. In total 279 people aged 17-25 died on Australia’s roads in 2011 (see Table 1). Road crashes are the leading cause of death for this age group.

NRSC work and projects

The Council has a number of projects completed, ongoing, or in planning. Key examples of each are described below, to provide insight into the work of the NRSC.

Indigenous driver training

The Driver Safe NT Remote project (see Figure 1) is a flagship project for the NRSC, which is providing \$1m of funding over two years. This innovative trial involves a driver training and education program being delivered to specific indigenous communities in remote areas of the Northern Territory over a two-year period, which commenced at the end of March 2012.

A major issue facing regional and remote indigenous communities is the lack of licensed drivers. A complex range of factors contribute to this, including issues with

proof of formal identification which their non-indigenous counterparts take for granted, language barriers, the reduced availability of licensing services, plus a lack of access to appropriate vehicles and supervised learner driving. Directly associated with these challenges are a disproportionately high indigenous prison population rate due to a high number of repeat traffic offences, and a reduced ability to access employment and other social and developmental opportunities. The associated over-representation of indigenous people in road fatalities and injuries is also well recognised. This confluence of factors is a key contributor to disadvantage.

This project addresses the above factors. The Council also expects that this program will foster safer behaviour by providing improved driving experience while learning, and through the incentive to comply with road rules by having a licence to lose and starting out within the system instead of on the outside from the beginning. The NRSC is a joint funder of the program in partnership with the NT Department of Lands and Planning and the Territory Insurance Office. The NRSC funding will assist this program in building capacity within indigenous communities, directly improving road safety and overcoming barriers to obtaining a licence and finding employment for indigenous drivers. These objectives strongly support the NRSC’s key priority of indigenous road safety.

In the short time the program has been running many indigenous people have already gained a licence, and as an unexpected benefit of having the relevant staff available in the community, six drivers were able to upgrade their licences to become “bush taxi” drivers.

These early successes already point to the possibility of similar programs being adopted successfully in other jurisdictions.

Table 1. Road traffic deaths by age group and gender in Australia

Year	Males	Females	Age 0-16	Age 17-20	Age 21-25	Age 26-39	Age 40-59	Age 60 +
2001	1,265	471	136	245	205	410	374	376
2010	980	371	74	173	163	305	356	280
2011	933	356	98	136	143	277	340	294

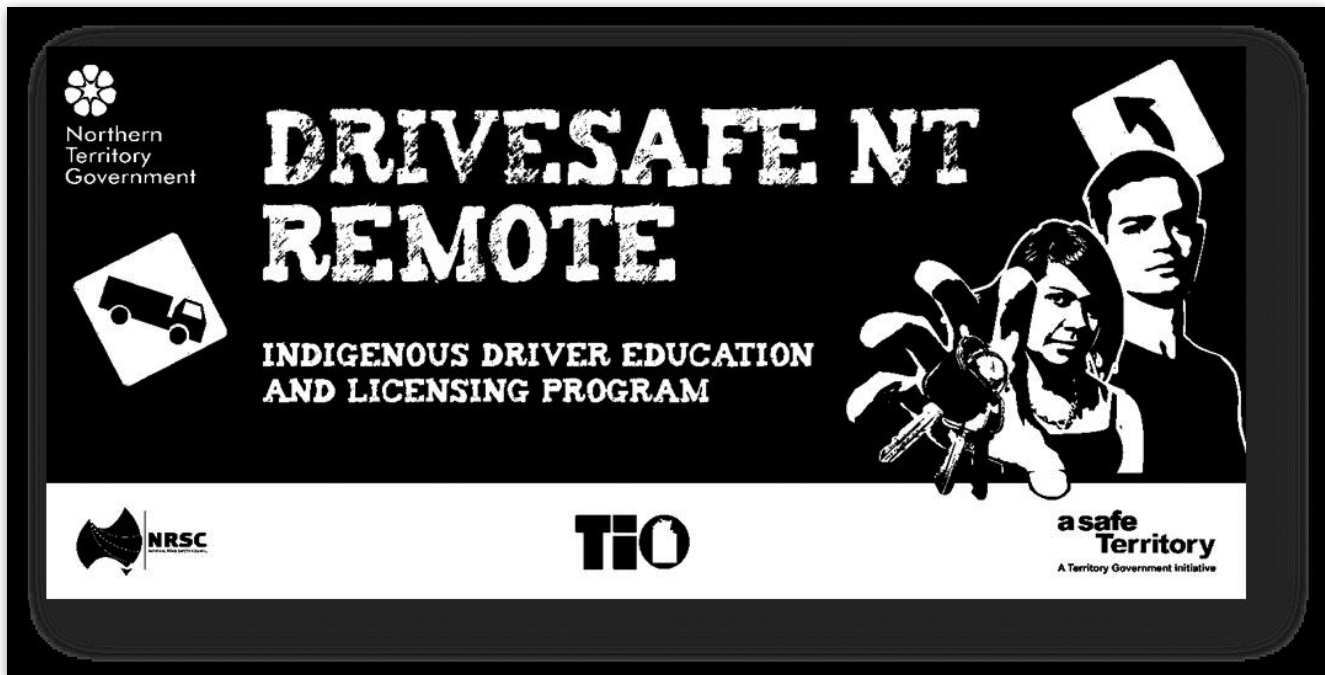


Figure 1. Promotional material for the Driver Safe NT Remote project

Engaging the Road Safety and Road User Communities

A key role of the NRSC is to consult and engage with stakeholders, the community and Government for road safety. The Council has delivered effectively on this role. Road safety is a complex problem in which commitment and concerted actions from many players are required to succeed in reducing the toll of death and serious injury. Some sound evidence-based road safety policy and practice can be challenging for the community to accept. NRSC aims in consultation and engagement are to increase awareness and sustained commitment by all actors in the road safety field, to increase community understanding of the National Road Safety Strategy [1] and the need for change to improve road safety, to promote and facilitate road safety, to forge critical partnerships across relevant government, industry and community sectors. The NRSC has been active in this arena.

Engaging with stakeholders

The Council lobbied the road freight industry on speed limiter tampering. Invited talks promoting road safety were also delivered to meetings of key road safety stakeholders: the trucking industry at ITTEC12: The International Truck, Trailer and Equipment Conference, Melbourne; the Australasian College of Road Safety (ACRS) seminar in Adelaide; and the ACRS Media and Morality Seminar, Sydney. Further formal talks and informal discussions are already planned for the remainder of the year, with various stakeholders.

The Council has also consulted many other organisations prominently including the Australasian New Car Assessment Program (ANCAP), Transport and Road Safety Research (The University of NSW), The George Institute for Global Health (The University of Sydney), Pedestrian Council of Australia, Centre for Automotive Safety Research (The University of Adelaide), Monash University Accident Research Centre, the Australasian College of Road Safety and the National Transport Commission. The Ambassadors have engaged with stakeholders such as the motoring clubs and police.

Finally, the Council also sponsors and supports strong advocacy groups and events, such as this ACRS Conference, other conferences, the Ride Beyond the Trauma event, and the National Local Government Road Safety Awards.

Engaging with Government

The Council have engaged the various levels of Government including visiting and consulting all the state and territory governments, as well as the Commonwealth; resulting in better understanding of road safety issues, and improved collaborations. Key changes from these meetings include working on specific issues within jurisdictions, and a focus on rural road safety in response to the over-representation of rural and regional people in serious crashes compared with metropolitan dwellers. The Council sponsored the National Local Government Road Safety Award, provided road safety analysis and advice to the Motor Accidents Commission of South Australia

(MAC), and lobbied for a ban on radar detectors in Western Australia. The Council also promoted evidence based road safety practice in face to face meetings, conversations and correspondence with Ministers and their staff.

Engaging the public through various media

The NRSC is again upgrading its website to better represent and communicate its messages. The ambassadors have been invaluable in continuing engagement with the community on road safety issues, especially through Ms Melissa Doyle on television and Mr Neil Mitchell on radio.

This year, the NRSC contributed to the public dialogue on road safety by regular reporting of the Council's initiatives and views in the media. The NRSC received more media coverage than last year, stimulating public interest and dialogue. This has included state and national television coverage, many regional, state and national radio interviews, and extensive print media coverage. Coverage has included over 40 radio interviews in 2012 and has often been high profile and national, including national television (Sunrise, and The Project) as well as front page stories (Sydney Morning Herald). The Council promoted its activities and key actions from the United Nations Global Road Safety Plan [4] and the National Road Safety Strategy [1], including:

- The application of safe system principles.
- The over-representation of rural people in serious crash and the risks of trees near roadsides.
- Safer vehicles for young drivers.
- Wire rope barriers.
- Road safety statistics and risk.
- Holidays and driving risks.
- The safety value of enforcement and the success of double demerit points in NSW.
- The importance of speed enforcement for road safety.
- Point to point speed enforcement.
- Speed limits that better reflect risk.

Good Gear Guide and the Driveway safety brochure

The NRSC has funded and distributed a number of information brochures targeting particular communities of interest and assisting in heightening public awareness of specific areas of risk in road safety, leveraging the benefits of national purchase rather than by each jurisdiction. These include *The Good Gear Guide*, an evidence-based publication advising motorcyclists on the best type of

protective clothing to use when riding a motorcycle and the *Where Are Your Kids* brochure that addresses safety in home driveways to assist in avoiding the unfortunate reality of children being run over and killed or seriously injured in driveways.

Visiting drivers

Significant risk is created by international drivers coming to Australia for holidays from countries in which they have learned to drive on the right side of the road. It is easy for drivers to revert to old habits and start driving on the right in Australia, risking severe crash types such as head-on crashes. This is a particular challenge for road safety management because the conventional means of communication to the motoring public (such as through television or newspapers) are not likely to be effective for this risk group. The NRSC has designed stickers to go into hire cars to help manage this risk. These KEEP LEFT stickers with appropriate guiding arrows are designed to be placed inside hire cars. One major hire company has already ordered the stickers and the NRSC is negotiating with the other major companies.

Motorcycle and scooter safety summit

The NRSC is working towards hosting, in consultation with the Motorcycle Safety Consultative Committee, a Motorcycle and Scooter Safety Summit late in 2012. Attendance would be invited including key stakeholders representing the various interest groups that have links to motorcycling activities. The NRSC wants this forum to tackle real issues, engage in frank discussions, and develop achievable outcomes that will assist in increasing safety for motorcyclists.

Survey of Community Attitudes to Road Safety

The NRSC jointly funded a survey of community attitudes to road safety, with the Department of Transport and Infrastructure (Commonwealth). A total of 1,555 interviews were conducted with people aged 15 years and over. The issues examined include: perceived causes of road crashes, exposure and attitudes to random breath testing, attitudes to speed, perceptions of police enforcement, mobile phone use while driving, reported usage of seatbelts, involvement in road crashes, and experience of fatigue while driving. The results of the survey are available for all to use, at: http://www.infrastructure.gov.au/roads/safety/publications/2011/community_att_11.aspx

Other projects planned and underway

The NRSC has a number of other projects underway or committed, including:

- Funding and contributing content input to the Monash University Accident Research Centre's development and delivery of a road safety leadership and management training program; an important capacity building program for road safety management.
- Reviewing and assimilating information on speed, speeding and road safety for the production of readily accessed and understood materials on this complex and poorly understood issue.
- Advocating for the effective inclusion of road safety in the national school curriculum, to ensure road safety can be taught consistently in schools reaching children from an early age.
- Examining the features and effectiveness of safe driving agreements.
- Managing a project to evaluate the suitability of area classifications (as remote, regional, and urban, etc.) for appropriateness for road safety data and comparison purposes. The identification of a suitable area classification will allow more effective targeting and management of road safety for remote, regional and metropolitan environments, rather than maintaining almost purely state and territory based comparisons, which can be misleading.
- Support to promote safer vehicles to the community, based on the Used Car Safety Ratings and further support for promotion of the ANCAP ratings of new vehicles.

Conclusions

The NRSC has strategic and structural advantages in the fight to eliminate death and serious injury on our roads. It is making full use of these advantages in advocacy, support of research, provision of programs and educational materials. The Council is advocating strongly for road safety from a position of independence, is providing sound evidence-based advice to Governments, and is managing projects to directly improve road safety and provide information to leverage road safety investment.

The NRSC also believes that serious injury data could be much more useful in advocacy and promotion of issues to the public if these data were available sooner. The NRSC appreciates that there is a challenge in delivering this.

Acknowledgement

The NRSC is funded by each state and territory government and the Commonwealth government.

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By writing for the journal, you have the opportunity to contribute to the important exchange of views and information on road safety. Articles on any aspect of road safety are welcome and may be submitted as papers for the peer-reviewed section of the journal, or as contributed articles. **Articles are now invited for issues in 2013.**

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Next issue: The next issue of the journal, Vol 24.1, will be a Special Issue devoted to the Safer People pillar of the Safe System. Articles are now invited for this issue to be published February 2013.



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