[redacted]

From: RoadSafetyStrategy
Subject: Response to the DRAFT 2021 to 2030 NRSSP (Part 1) - The Mammoth in the Room - Repeating the Reasons the Preceding NRSSP Failed
Attachments: SMH - Opinion - Comment - Gay - P2P Speed Cameras - 161114A - Ed.pdf; ATC - National Road Safety Strategy - 2011 to 2020 - Excerpts - Speed Gay & P2P Cameras - HiLite.pdf; SMH - Opinion - Towards nothing - the sorry fate of a road safety summit - 200528A.pdf; 12.pdf; Chester - Point-to-Point - Reply - 161122 HiLite.pdf

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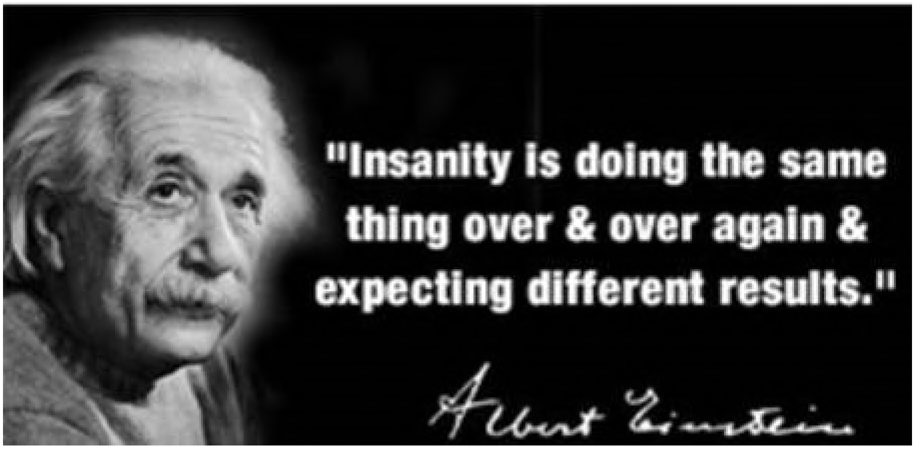
From: PCA <mail@walk.com.au>
Sent: Saturday, 13 March 2021 11:21 PM
To: Minister McCormack <minister.mccormack@infrastructure.gov.au>; Scott.Buchholz.MP@aph.gov.au; michael.mccormack.MP@infrsatructure.gov.au
Cc: [redacted]
Subject: Response to the DRAFT 2021 to 2030 NRSSP (Part 1) - The Mammoth in the Room - Repeating the Reasons the Preceding NRSSP Failed



The Hon Michael McCormack and the Hon Scott Buchholz

Dear Ministers

<u>Response to the DRAFT 2021 to 2030 NRSSP</u>
<u>The Mammoth in the Room - Repeating the Reasons the Preceding NRSSP Failed</u>

Below is a copy of our the email to Gabby O'Neil Assistant Secretary, Head of the Office of Road Safety, on Wed 2 September 2020, re the NRSSP 2021 to 2030.

She hasn't even bothered to acknowledge it, let alone reply.

That's because it highlights the very issue that she won't address – incorporating a requirement for the jurisdictions to comply with their signed commitments.

Everyone agrees that the 2011 to 2020 NRSSP was an unmitigated failure for this very reason.

So what do Public Servants like Gabby O'Neill do when there's a Mammoth in the Room?

They filter any issues which are politically difficult, bury their heads in the sand, cross their fingers and hope the problem goes away.

It won't.

There's a mammoth in the room.

So they have created a brand new 2021 to 2030 NRSS with precisely the same Mammoth in the Room – spending millions on a new and seriously costly Super Yes Ministry whose primary mission is to announce more concrete and bitumen – all dressed up as ROAD SAFETY.

Enforcement (the dirty word in Road Safety) won't ever get a mention.

It will be Infrastructure and Education on steroids.

On 12 September 2018 (two and a half years ago), at the launch of this new and improved NRSSP, I addressed the DPM, the Hon Michael McCormack on this very matter.

I provided Minister McCormack with the details of how the NSW signed the 2011 to 2020 NRSSP promised to turn on P2P Speed Cameras by 20 May 2014 and had still failed to honour their commitment.

Read the excerpts (quote):

> Evaluations have demonstrated that point-to-point enforcement reduces speeding, resulting in a low infringement rate and significant reductions in deaths and serious injuries. In the UK, reductions in the number of people killed or seriously injured typically exceed 50 per cent. In Northamptonshire, fatal and serious injuries reduced by 78 per cent in the first five years of operation on the A43 and by 85 per cent in the first four years of operation on the A428.
>
> Point-to-point enforcement has a high level of public support. It has been described as fairer than spot speed enforcement because speeding is detected over a greater distance, demonstrating the behaviour was intentional and not due to a momentary lapse of concentration. [20, 21, 22]

FIRST STEPS — actions for the first three years

8. Improve compliance with speed limits across the road network:
   a. Adopt best practice enforcement, including a combination of on-road policing and speed camera technologies, with a mix of covert and overt strategies.
   b. Install where appropriate point-to-point cameras to improve speed compliance among all vehicles.

I informed the Minister unless there was a requirement for the jurisdictions to comply with their signed commitments and unless there was a formal "carrot and stick" agreement, then we would simply be repeating the mistakes of the previous NRSSP.

Minister McCormack stated,:

"In so far as Point to Point Technology is concerned and turning it on ... that would be a good start."

LAUNCH OF THE INQUIRY INTO THE NATIONAL ROAD SAFETY STRATEGY 2011 TO 2020

Question Time: Harold Scruby, Dr John Crozier and Dep PM Michael McCormack Parliament House Canberra
12 September 2018

Watch the Video

Watch the video of my question to the DPM:

https://youtu.be/QPkD6ZbCMEo

And here we are, two and a half years later and ten years after the original NRSSP was signed by Minister Duncan Gay and the NSW Government is still refusing to turn on the P2P Speed Cameras for ALL vehicles.

There are many other examples of how the jurisdictions made a joke of the original NRSSP, including how the former CLP Government in the Northern Territory legislated to allow unlimited speed on undivided roads (with no shoulders). This was the only jurisdiction in the western world to permit this behaviour – at a time when their death toll was the highest in the Developed World at 28 deaths per hundred thousand:

National Road Safety Strategy 2011–2020

FIRST STEPS: Actions for the first three years

11. Review speed limits where risk levels are high and engineering solutions are not feasible or cost-effective:
    a. Set safe speed limits on road lengths that are narrow, have substantial levels of roadside hazards, have many intersections or property entrances, are winding or undulating, or have higher than average serious casualty crash rates.
    b. Reduce speed limits at high-risk intersections, especially on high-volume outer urban arterials.
    c. Work with local governments to expand the number and scope of projects that implement safe speed limits in areas of high pedestrian and cycling activity.
12. Develop new risk-based national speed limit guidelines for different road categories/functions. Guidelines should encourage consistent limits based on measured risk/crash rates, while minimising multiple speed zones over short distances.

The NT Government completely ignored their signed commitments regarding Speed – meanwhile not one politician in the Federal Parliament spoke up.

But it gets worse.

The reason that the cameras are not being turned on is because the National Party (Minister McCormack's Party) refuses to turn them on.

The NRSSPs state that speeding is the greatest killer on our roads, but certain Nats believe it's a rite of passage.

The Deputy Premier, John Barilaro and one of his senior Minsters Adam Marshall both have such appealing drink-driving and speeding records, that they should not be allowed to sit in the NSW Parliament.

Read the press clippings below and be appalled and disgusted. Yet these are the same people who vote against P2P Speed Cameras so they can continue to flout our laws and put the lives and limbs of other innocent road users in peril.

In the very wise words of NSW Transport Minister Andrew Constance: "We must get the politics out of Road Safety".

And until you can come up with a NRSSP which removes the politics and requires the politicians to comply with their signed commitments, you will be wasting millions, if not billions of tax-payers' dollars on a Plan which is already doomed to fail.

Einstein was spot on. This new sanitised, homogenised and double pre-shrunk NRSSP is pure, unadulterated, irrefutable insanity.

More to come: Office of Road Safety Canberra bureaucrats required to emerge from their bitumen bubble and actually meet a "pedestrian".

Regards

Harold Scruby
Chairman/CEO

Pedestrian Council of Australia Limited
The Walking Class
Registered Charity (ACNC) No: 18075106286
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Barilaro will lose driver's licence after speeding in ministerial car

By Alexandra Smith
October 8, 2020 — 8.25pm

NSW Deputy Premier John Barilaro will lose his licence after receiving several fines for driving offences, including speeding in a ministerial car.

Mr Barilaro received the fines, one of which includes using a mobile phone while behind the wheel, since going on mental health leave. He has not yet paid them.

Deputy Premier John Barilaro is set to lose his licence after a string of driving offences. *CREDIT:KATE GERAGHTY*

Once they are finalised, Mr Barilaro – who travels extensively around the state – will lose his licence.

A spokeswoman for Mr Barilaro said the driving offences in question did not contribute to the Nationals leader's decision to take personal leave.

Advertisement

Mr Barilaro is on mental health leave after a bruising period in which he threatened to destroy the Coalition over a koala planning policy. He intends to return from leave in "coming weeks".

"As is absolutely appropriate, the Deputy Premier will pay any fines and cop all penalties associated with the driving infringements," the spokeswoman said.

"The Deputy Premier is currently on mental health leave, which he has been open and transparent about.

"A number of factors over a period of time contributed to the Deputy Premier making the decision to take leave, including dealing with the aftermath of bushfires across the state, the prolonged drought, and the death of his father."

The fines were forwarded to Mr Barilaro from the Department of Premier and Cabinet, which is responsible for the ministerial cars.

The emergence of the details of his infringements is likely to cause more tension in the Coalition, with several Nationals' sources saying the fines were only just sent to Mr Barilaro.

"This suggests a serious data breach from within an agency," one source said.

Another senior Nationals source said: 'The Liberals will stop at nothing to get him."

Mr Barilaro announced he would take leave after a tumultuous period in Macquarie Street, in which the Nationals threatened to move to the crossbench and destroy the government's majority.

The threat did not eventuate after Premier Gladys Berejiklian issued an ultimatum, which was to back down or she would swear in an all-Liberal ministry.

Nationals' deputy leader Paul Toole has been acting as Deputy Premier in Mr Barilaro's absence, and worked with Planning Minister Rob Stokes to reach an agreement over the koala policy.

Mr Barilaro still has the support of the Nationals' party room, but several Liberal ministers have said that his absence has delivered a "new calm" to the Coalition.

The Monaro MP told the *Herald* during the 2019 election campaign that he intended to stand down as Deputy Premier mid-term and serve out the Parliament on the backbench.

Mr Barilaro has since said he would make the decision over the Christmas break.

Leadfoot MP revealed: The abysmal driving record of state’s youngest politician

THE state’s youngest MP, Adam Marshall, has been exposed as a serial speeding offender who was granted a “good behaviour licence” eight days before he was pulled over for drink-driving.

Geoff Chambers

Telegraph - August 1, 2014

THE state’s youngest MP, Adam Marshall, has been exposed as a serial speeding offender who was granted a “good behaviour licence” eight days before he was pulled over for drink-driving.

The Northern Tablelands Nationals MP, who took the seat after former speaker Richard Torbay departed, has been caught speeding 17 times since obtaining his P-plates.

The 29-year-old last night told The Saturday Telegraph he would stand at next year’s election after winning pre-selection in February.

The former Gunnedah mayor admitted he lodged paperwork with the RMS to obtain a good behaviour licence instead of copping a three-month suspension.

“I’m very embarrassed about my record and I’ve learned a lot of lessons from my recent experience,” Mr Marshall said.

“I’ve had to face up to those issues. I was an idiot and I did the wrong thing.”

Mr Marshall said the Northern Tablelands electorate would determine his fate whether he stays or goes at next year's election. Picture: Barnsley Tim

Despite his speeding record, Mr Marshall said he had never undergone any training or education about road safety. "I have been a leadfoot and I've learned … there's more consequence than … just a few points and paying a fine."

On July 15, Mr Marshall appeared at Glen Innes Local Court, where magistrate Karen Stafford handed him a $2000 fine and nine-month licence suspension.

On June 27 this year the Armidale resident was pulled over in Glen Innes and registered a blood-alcohol reading of 0.112 on a Friday night.

Days after his court date, Mr Marshall confirmed he attended a leadership forum at the Armidale High School where he discussed his drink- driving offence.

Pedestrian Council of Australia CEO Harold Scruby said Mr Marshall should resign for putting lives at risk.

"This guy is a serial offender, in every sense of the category, and he must resign," Mr Scruby said.

"He should be sacked immediately because he has compromised people's lives not once, not twice, but multiple times. It sets every wrong example about parliamentarians who should be leaders."

Mr Marshall said the Northern Tablelands electorate would determine his fate at next year's election.

Deputy Premier Andrew Stoner, who has admitted to a poor speeding record in the past, said he had asked Mr Marshall to “stand down” from his parliamentary roles.

He had stepped down as temporary Speaker and deputy chair of the State and Regional Development.

“The public rightfully expects high standards from our MPs and Mr Marshall will be the first to admit he has not met those standards, with two speeding offences and a PCA offence occurring in the 12 months since he became an MP,” Mr Stoner said.

“Following the PCA offence, I spoke to Mr Marshall and reiterated the need for all MPs to set the right example for the community.”

Opposition roads spokesman Walt Secord called on Premier Mike Baird and Mr Stoner to detail their full involvement in Mr Marshall’s drink-driving incident, saying the public had a right to know the extent of their involvement in the matter.

Mr Baird did not comment on the matter last night.

From: PCA [mailto:mail@walk.com.au]
Sent: Wednesday, 2 September 2020 3:00 PM
To: 'ONEILL Gabby'
Cc: '[redacted]
Subject: RE: Office of Road Safety - What's the point?

PEDESTRIAN COUNCIL OF AUSTRALIA

Safety - Amenity - Access - Health

The Walking Class

Patron: Dame Quentin Bryce AD CVO

Hi Gabby

Do PEDESTRIANS exist in your plans?

Or is it all about INFRASTRUCTURE and MOTOR VEHCILES?

And have you had any further thoughts as to how you might "persuade" the NSW Government to turn on the P2P Speed Cameras for ALL vehicles.

After all, on 12 September 2018 (almost two years ago), the DPM, the Hon Michael McCormack stated,:

"In sofar as Point to Point Technology is concerned and turning it on ... that would be a good start."

LAUNCH OF THE INQUIRY INTO THE NATIONAL ROAD SAFETY STRATEGY 2011 TO 2020

Question Time: Harold Scruby, Dr John Crozier and Dep PM Michael McCormack Parliament House Canberra

12 September 2018

Watch the Video

https://youtu.be/QPkD6ZbCMEo

On 20 May 2011, Duncan Gay signed the 2011 to 2020 Road Safety Strategy (see attached) and committeed the NSW Government, in writing to:

FIRST STEPS — actions for the first three years

8. Improve compliance with speed limits across the road network:
   a. Adopt best practice enforcement, including a combination of on-road policing and speed camera technologies, with a mix of covert and overt strategies.
   b. Install where appropriate point-to-point cameras to improve speed compliance among all vehicles.

If you can't get Governments to comply with their signed, written promises, (eg – to turn the P2P camers on fo ALL veicles by 20 May 2014) then what's the point of any further "National Road Safety Strategies" and what's the point of another expensive bureaucracy, (ie) the Commonwealth Office of Road Safety?

Regards

Harold

Harold Scruby
Chairman/CEO

Pedestrian Council of Australia Limited
The Walking Class
Registered ACNC Charity No: 18075106286
Telephone: (02) 9968-4555 - [redacted]
Email: mail@walk.com.au - Internet: www.walk.com.au
PO Box 500 - NEUTRAL BAY NSW 2089 – AUSTRALIA - ABN 18 075 106 286

From: Office of Road Safety [mailto:officeofroadsafety@infrastructure.gov.au]
Sent: Monday, 31 August 2020 12:32 PM
To: [redacted]
Subject: Office of Road Safety August 2020 Newsletter [SEC=OFFICIAL]

OFFICIAL

Dear Colleagues,

Please find attached the latest Office of Road Safety Newsletter.

I hope you're all doing well during these uncertain times.

Many thanks to those that have been in consultations with us this month. We look forward to having further discussions as we continue refining the priorities, milestones and targets for the next Strategy.

Please take care, regards,

Gabby

Gabby O'Neill
Assistant Secretary, Head of the Office of Road Safety
Office of Road Safety | Surface Transport Division
Department of Infrastructure, Transport, Regional Development and Communications
t: 02 6274 6492 | **m:** 0419 108 641
e: gabby.oneill@infrastructure.gov.au
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GPO Box 594, Canberra ACT 2601

Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

OFFICIAL

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ATC

AUSTRALIAN
TRANSPORT COUNCIL

National Road Safety Strategy 2011–2020

The Hon Anthony Albanese MP
Minister for Infrastructure and Transport
Commonwealth

The Hon Catherine King MP
Parliamentary Secretary for Infrastructure and Transport
Commonwealth

The Hon Duncan Gay MLC
Minister for Roads and Ports
New South Wales

The Hon Terry Mulder MP
Minister for Roads, Minister for Public Transport
Victoria

The Hon Annastacia Palaszczuk MP
Minister for Transport, Minister for Multicultural Affairs
Queensland

The Hon Craig Wallace MP
Minister for Main Roads
Queensland

The Hon Tom Kenyon MP
Minister for Road Safety
South Australia

The Hon Troy Buswell MLC
Minister for Transport, Minister for Housing
Western Australia

The Hon David O'Byrne MP
Minister for Infrastructure, Minister for Economic Development, Minister for Workplace Relations
Tasmania

The Hon Gerald McCarthy MLA
Minister for Transport
Northern Territory

Simon Corbell MLA
Attorney General
Australian Capital Territory

Australian Transport Council
20 May 2011

Behavioural factors

Certain behavioural factors continue to be implicated in many serious casualty crashes. The most significant are identified below.

Table 4: Deaths and serious injuries by main behavioural factor

	Proportion of total deaths (%)	Proportion of total serious injuries (%)
Speeding	34	13
Drink driving	30	9
Drug driving	7[a]	2
Restraint non-use	20	4
Fatigue	20–30[b]	8

Note: categories are not mutually exclusive.

a. Estimate excludes fatalities involving both alcohol and other drugs, which are included in the drink driving estimate.

b. Estimates of fatigue involvement in serious casualty crashes vary considerably. However, it is widely recognised as a significant contributing factor.

Geographic distribution of crashes

As indicated in Table 5, crashes are widely dispersed across Australia's metropolitan, regional and remote areas. Furthermore, Figure 11 shows that the incidence of fatal crashes on a population basis is substantially higher in the outer regional and remote parts of the country. The issues in different areas can vary considerably, even though there are substantial underlying similarities. What is materially important in one area may not be as important in another.

Table 5: Distribution of fatal road crashes by remoteness area, 2002–06

	NSW (%)	Vic (%)	Qld (%)	SA (%)	WA (%)	Tas (%)	NT (%)	ACT (%)	Aust (%)
Major cities	35	40	29	38	36	0	0	88	34
Inner regional	28	40	33	27	21	37	0	7	30
Outer regional	15	13	23	23	17	50	29	0	18
Remote	1	1	7	5	9	10	23	0	4
Very remote	1	0	4	5	14	1	44	0	4
Unknown	20	6	4	1	3	2	4	5	9
Total	100	100	100	100	100	100	100	100	100

Point-to-point speed enforcement

Point to point speed camera technology allows continuous automated speed enforcement to be applied over an extended length of road. While fixed speed cameras are an effective mechanism for dealing with a specific location with known crash history[14], point-to-point cameras extend this over a much longer length of road and hence have a greater influence on drivers. Instead of checking the spot speed of vehicles at a fixed point on the road, the cameras measure the average speed of vehicles over a substantial distance. In this way, point-to-point enforcement targets sustained speeding behaviour and can be more acceptable to the public than single-camera enforcement [20, 21].

Point-to-point systems are used widely in Europe including in the UK (20 fixed systems and 20 temporary systems at road works), Italy (44 systems), Austria (2 fixed and 2 mobile systems) and the Netherlands (16 systems). Other European countries are trialling point-to-point systems.

Evaluations have demonstrated that point-to-point enforcement reduces speeding, resulting in a low infringement rate and significant reductions in deaths and serious injuries. In the UK, reductions in the number of people killed or seriously injured typically exceed 50 per cent. In Northamptonshire, fatal and serious injuries reduced by 78 per cent in the first five years of operation on the A43 and by 85 per cent in the first four years of operation on the A428.

Point-to-point enforcement has a high level of public support. It has been described as fairer than spot speed enforcement because speeding is detected over a greater distance, demonstrating the behaviour was intentional and not due to a momentary lapse of concentration. [20, 21, 22]

Intelligent Speed Adaptation (ISA) systems are vehicle-based devices incorporating digital speed limit maps and satellite navigation technology. They have proven effectiveness in improving driver compliance with posted speed limits by warning drivers when they are speeding or (in more interventionist approaches) by physically limiting the speed of the vehicle. Evaluation studies have found substantial crash reduction benefits for the speed limiting systems. Implementation approaches could include voluntary driver assist systems for the general community, speed limiting systems for fleet operations, and/or mandatory ISA systems for high-risk groups (such as repeat speeding offenders).

14 An independent evaluation of 28 fixed speed cameras in New South Wales revealed a 71 per cent reduction in speeding, resulting in a 90 per cent reduction in fatalities and a 20 per cent reduction in casualty crashes at the treated locations.[2].

FIRST STEPS — actions for the first three years

8. Improve compliance with speed limits across the road network:
    a. Adopt best practice enforcement, including a combination of on-road policing and speed camera technologies, with a mix of covert and overt strategies.
    b. Install where appropriate point-to-point cameras to improve speed compliance among all vehicles.
    c. Examine options for improved enforcement of motorcycle speeding.
9. Improve the use of sanctions to more effectively deter people from speeding.
10. Develop a national public information campaign about the community safety benefits of complying with speed limits. This will provide education resources suitable for use by government agencies, local governments and community forums.
11. Review speed limits where risk levels are high and engineering solutions are not feasible or cost-effective:
    a. Set safe speed limits on road lengths that are narrow, have substantial levels of roadside hazards, have many intersections or property entrances, are winding or undulating, or have higher than average serious casualty crash rates.
    b. Reduce speed limits at high-risk intersections, especially on high-volume outer urban arterials.
    c. Work with local governments to expand the number and scope of projects that implement safe speed limits in areas of high pedestrian and cycling activity.
12. Develop new risk-based national speed limit guidelines for different road categories/functions. Guidelines should encourage consistent limits based on measured risk/crash rates, while minimising multiple speed zones over short distances.
13. Facilitate the implementation of Intelligent Speed Adaptation (ISA) systems:
    a. Encourage the development of digital speed limit maps.
    b. Examine the scope to require advisory ISA in all government fleets; and mandatory speed limiting ISA and/or other technologies for recidivist speeders and P-plate drivers.
    c. Initiate discussion with insurers to encourage voluntary fitting of ISA and recorders through lower insurance premiums, especially for young drivers.
14. Increase the effective application of chain of responsibility legislation to prosecute heavy vehicle speeding (including speed limiter) offences, and harmonise legislation to assist cross-border enforcement.

COMMENT

SMH - 14 NOVEMBER 2016

Duncan Gay should be stripped of responsibility for road safety

Harold Scruby

Apart from the pain, grief and suffering, road trauma costs NSW about $8 billion per annum. According to Transport for NSW, speed-related fatalities comprise 42 per cent of the deaths on our roads.

The shocking news uncovered by the *Herald* last week that up to 16 people have been killed in underused point-to-point speed camera zones since the cameras were installed, demands road safety be stripped from Transport Minister Duncan Gay's portfolio.

The speed cameras NSW doesn't use

NSW has the biggest network of point-to-point speed cameras in the country but doesn't use them to target cars.

Road safety is the natural enemy of mobility. That the minister for mobility (roads) is one and the same minister for road safety is as absurd as the minister for mining being the minister for the environment.

The NSW government should let Gay do what he's good at: building roads. We should emulate the successful Victorian system by moving road safety to a separate ministry where there's an economic imperative to reduce road trauma.

More than 335 people have died on our roads this year and the NSW road toll is up more than 17 per cent on the three-year average. The irony of this tragedy is that people in the bush, Gay's constituency, are three times more likely to be killed in a crash than people in the city.

Gay's mismanagement of his road safety portfolio is not only costing many lives and limbs, it's costing NSW a fortune. His behaviour in selecting which speeding drivers should be booked and which should not is discriminatory.

In February 2011, the Pedestrian Council of Australia lodged a freedom-of-information request, which revealed that during six months in two point-to-point speed camera zones, 117 heavy vehicle drivers had been warned for speeding but more than 94,000 other motorists had also been detected speeding and weren't even warned.

In May 2011, Gay signed the National Road Safety Strategy along with all other roads ministers. The strategy sang the praises of point-to-point enforcement. Gay also agreed as part of the strategy to "improve compliance with speed limits across the road network ... install where appropriate point-to-point cameras to improve speed compliance among all vehicles".

The road toll is "going through the roof", says the Pedestrian Council's Harold Scruby. Photo: Kirk Gilmour

In NSW, point-to-point cameras are only placed in black spots. In the other jurisdictions they operate in – Victoria, Queensland, SA and ACT – they issue fines, not warnings, to all vehicles.

In January 2013, we commissioned a second FOI request when there were 25 zones in operation. Again, a handful of trucks had been warned. But not one other motorist was detected. Gay had switched off the data capture. A convenient case of wilful blindness.

During this time Gay was forging an alliance with the NRMA. Generally, the Nats have a strong libertarian culture and they despise modern speed camera technology. When booked, the robotic excuse of these Libertarian Luddites is to chant: "Nanny state ... revenue raising".

Gay capitalised on this feeling and developed a very clever distraction: "High-visibility policing." They have demonised speed cameras. Gay once claimed they were cash cows and he'd sent a dozen to the naughty corner.

On average, police officers can book one vehicle every half an hour. When they speed to catch lawbreaking motorists, they risk their lives and those of other road users. And it's very expensive, costing at least $200 per ticket.

Speed cameras catch every speeding driver for threepence and don't compromise safety.

For the past four years, at least nine fixed cameras have been in so-called "warning mode" where vehicles detected speeding at up to 30km/h over the limit are sent three warnings before being issued with a penalty. The farce is that these warnings go to the owners of the motor vehicles and there's no requirement to state who was driving. It's totally ineffective and a huge waste of public money.

The NSW road toll is up 17 per cent on the three-year average.

In spite of the misleading advertising campaign of "Anywhere Anytime", mobile speed cameras are only permitted to operate in published locations with three warning signs, giving motorists a chance to slow down. Although they are bi-directional, Gay will only permit mono-directional enforcement.

Gay's godsend has been Opposition Leader Luke Foley. While spending three months campaigning for greyhounds, he was struck dumb about the 90 people who died on NSW roads during the same period.

Current NRMA president Kyle Loades continues to procrastinate and obfuscate. "When it comes to road safety, our view is that changes to the system need to be based on evidence," he said.

However, practically every reputable road safety organisation has begged the government to turn on the point-to-point cameras for all vehicles, including STAYSAFE, the Australasian College of Surgeons, the Australasian College of Road Safety, the Australian Trucking Association and the Auditor-General. And international studies agree: they show point-to-point cameras reduce fatalities by 50-85 per cent.

Harold Scruby is chairman of the Pedestrian Council of Australia.

[redacted]

From: RoadSafetyStrategy
Subject: FW: Response to the DRAFT 2021 to 2030 NRSSP – Part 2 - Treating Pedestrians with Utter Contempt
Attachments: DRAFT - NRSS 2021-2030 - draft-national-road-safety-strategy.pdf; David Levensin - Why Australian road rules should be rewritten to put walkers first 210107.pdf; PCA - Submission and Summary to Joint Select Committee on Road Safety - July 2020.pdf

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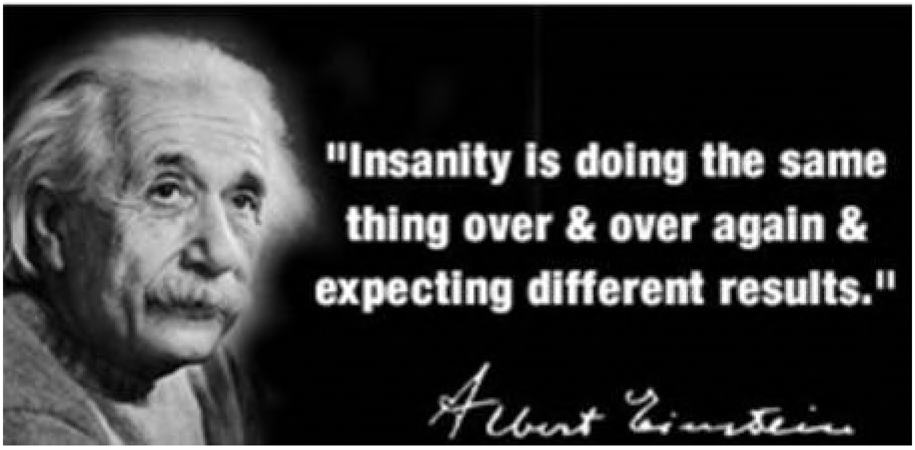
From: Pedestrian Council <pedestrian.council@gmail.com>
Sent: Monday, 22 March 2021 9:04 PM
To: ONEILL Gabby <Gabby.ONeill@infrastructure.gov.au>; Minister McCormack <minister.mccormack@infrastructure.gov.au>; Scott.Buchholz.MP@aph.gov.au; michael.mccormack.MP@infrsatructure.gov.au
Cc: [redacted]
Subject: Response to the DRAFT 2021 to 2030 NRSSP – Part 2 - Treating Pedestrians with Utter Contempt



The Hon Michael McCormack and the Hon Scott Buchholz
Parliament House
CANBERRA

Attention: Ms Gabby O'Neill

Dear Ministers

Response to the DRAFT 2021 to 2030 NRSSP – (Part 2)
Treating Pedestrians with Utter Contempt

On 28 October 2020, the new Office of Road Safety conducted a Vulnerable Road Users Webinar entitled "Vulnerable Road Users".

Minister Buchholz and Mr Pat Conaghan MP were present.

The Australasian College of Road Safety (of which we have been members for over two decades) were paid to conduct the Webinar and chose Dr Julie Hatfield as moderator.

She opened the meeting by calling on speakers representing (quote) "cyclists, motor-cyclists and later we'll hear from other minor vulnerable road-users".

She allocated two minutes from FOUR cyclists, two minutes from THREE motor-cyclists and much later on, allowed me, representing over 25 million pedestrians throughout Australia, TWO minutes, extended to three minutes.

It was such a farce it would make Sir Humphrey Appleby blush.

But it gets worse, in spite of our protestations and a letter from Dr John Crozier, co-author of the NRSSP 2021 to 2030, (see copy below) the Australasian College of Road Safety held another webinar in November 2020 entitled: "Protecting vulnerable road users".

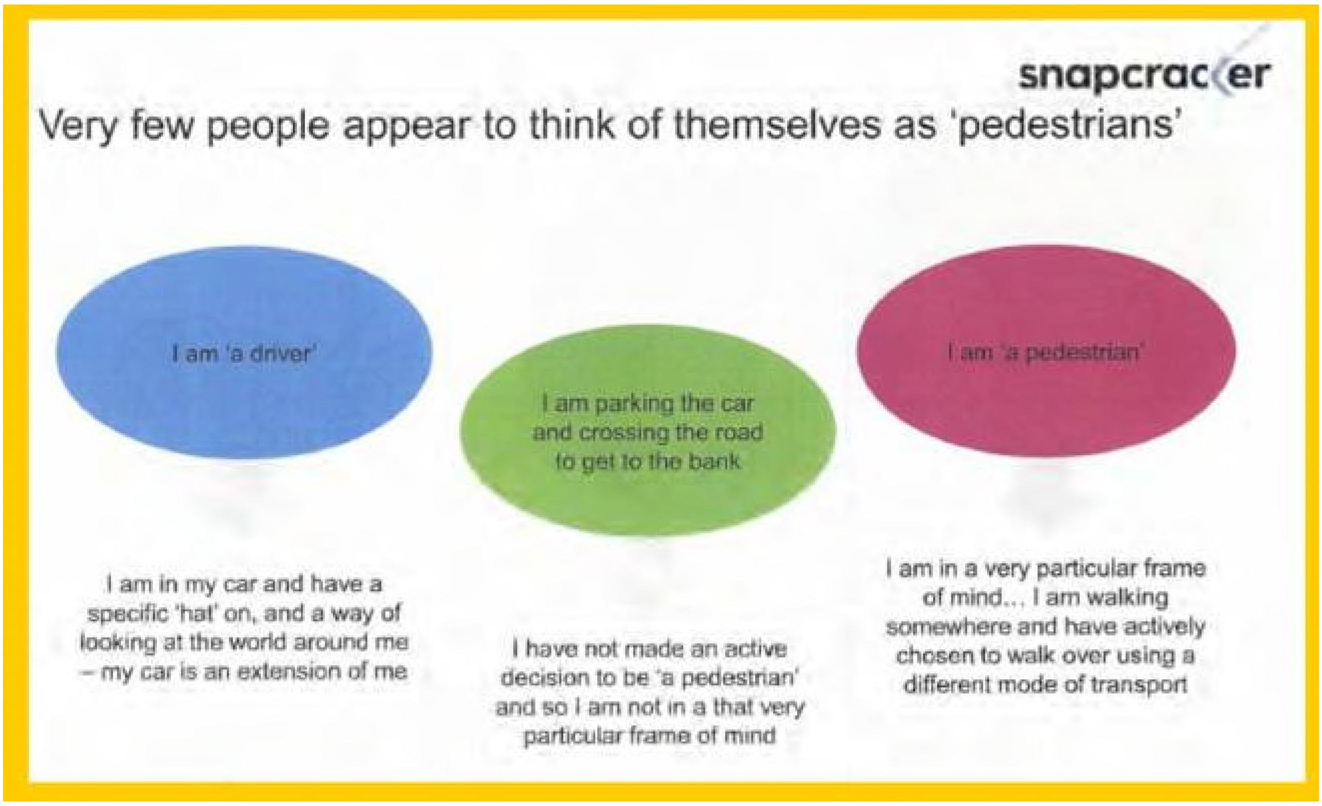
But it only included Cyclists and Motor-Cyclists. Pedestrians did not rate a mention.

The Transport for NSW Survey Travel Mode Survey of 2018/19 revealed that 65.3% of travellers were Pedestrians and 3.6% INCLUDED Cyclists and Motor-Cyclists

TRAVEL MODE (Sydney 2018/2019)			
	Trips	%	
Vehicle Driver	210,000	16.3%	
Vehicle Passenger	54,000	4.2%	
Train	75000	5.8%	
Bus	62000	4.8%	
Walk Only	588,000	45.6%	
Walk Linked	254,000	19.7%	65.3%
Other	47,000	3.6%	3.6%
TOTAL	**1,290,000**	**100.00%**	

But cyclists and motor-cyclists, but particularly cyclists, have managed to become “the loudest voice” and coerce politicians and bureaucrats that they should receive the lion’s share of attention and funding.

Qualitative research conducted by Transport for NSW in July 2016 may have recognised part of the problem …



But there are others who understand the big picture … including our future monarch

PRINCE CHARLES – 60 MINUTES (QUOTE):
"The whole of the 20th century has always put the car at the centre. So by putting the pedestrian first, you create these liveable places I think, with more attraction and interest and character ... liveability."

https://youtu.be/AV35EO3dmZA

And experts like Dr David Levinson, Professor of Transport – University of Sydney.

His excellent article attached entitled: Why Australian road rules should be rewritten to put walkers first, recommends that we put pedestrians at the top of the road hierarchy, based on the UK Manual for Streets – UK Department of Transport

Pedestrian safety needs to catch up to technology and put people before cars

What do we recommend?

The UK Manual for Streets presents a street user hierarchy that puts pedestrians at th
That is, their needs and safety should be considered first.

Consider first	Pedestrians
↓	Cyclists
	Public transport users
	Specialist service vehicles (e.g. emergency services, waste, etc.)
Consider last	Other motor traffic

A recommended hierarchy of street users.
Manual for Streets/UK Department for Transport

So what sort of hierarchy have our erstwhile Canberra bureaucrats decided behind their closed doors (giving the so-called key-stakeholders 4 weeks to respond):

NUMBER ONE PRIORITY: LOTS OF GLORIOUS SPAGHETTI FREEWAYS WITH TONNES OF BITUMEN AND CONCRETE – all in Latin


Foreword

A foreword will be included in the final Strategy

ii National Road Safety Strategy | 2021–2030 | Consultation Draft

National Road Safety Strategy | 2021–2030 | Consultation Draft 1

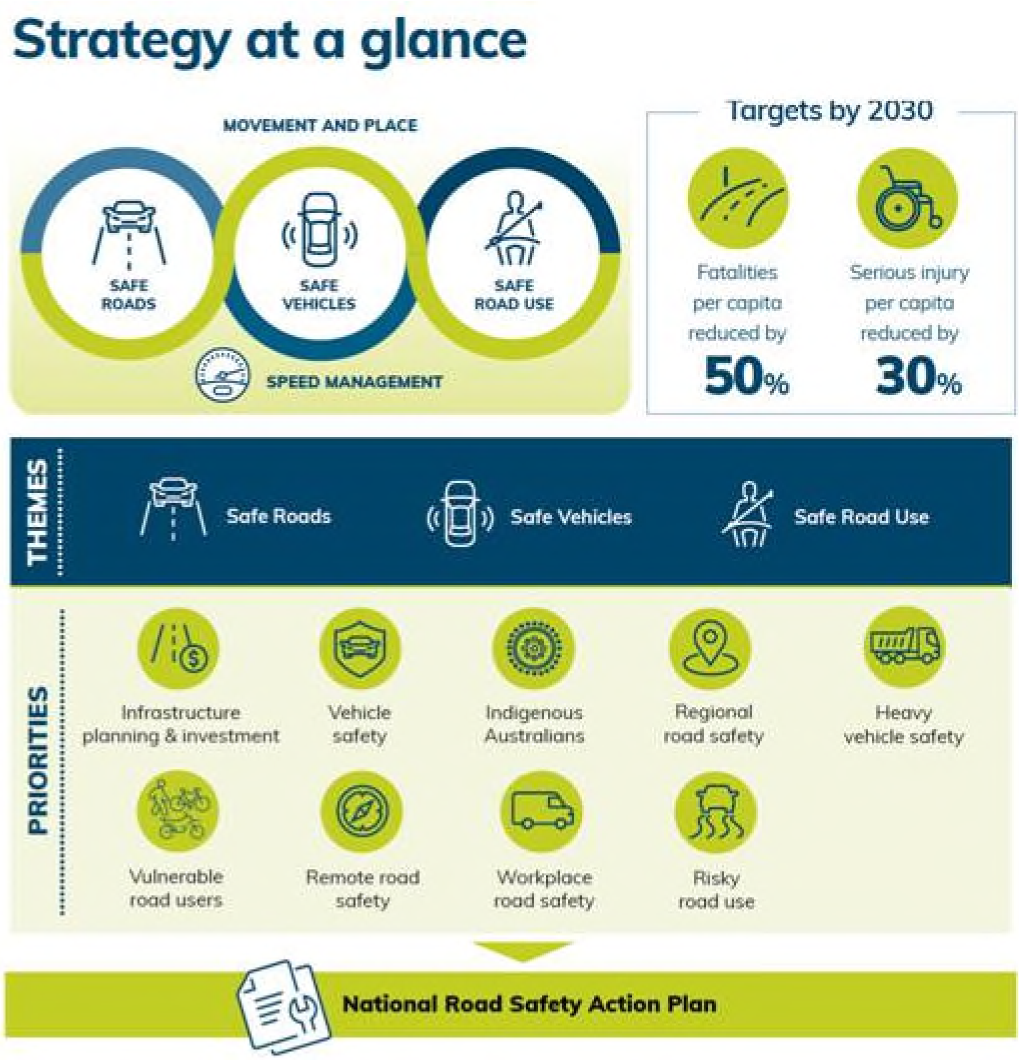
And then

1 Infrastructure
2 Vehicle Safety
3 Indigenous Australians
4 Regional Road Safety
5 Heavy Vehicle Safety

AND FINALLY ... wait for it

6 Vulnerable Road Users

AND AS USUAL THEY PUT PEDESTRIANS, CYCLISTS AND MOTOR-CYCLISTS ALL IN THE ONE BUNCH ... it's much cheaper that way



But what more would you expect from people who live in a city which was designed around the car, with the worst public transport system in Australia.

Pedestrians, cyclists and motor-cyclists have extraordinarily different needs and wants.

How many pedestrians have been killed and seriously injured by motor-cyclists and cyclists.

So why on earth would any logical person believe we should be treated as one group.

BITRE from your own Department of Infrastructure provides separate date and information for all three groups.

To dump us all together like this is an utter insult, but also proves the mentality of the people who are responsible for this glossy farce.

But the entire “strategy” is lacking in any details. It’s just full of sweeping statements and jargon.

For example, where is there any mention of the Stockholm Declaration:

Global 30km/h
130 road safety minsters supporting the Stockholm Declaration in February 2020 calling for default 30km/h limits. This was in turn endorsed by the UN General Assembly in August 2020 as a key component in speed management for the UN’s 2nd Decade of Action on Road Safety 2021-2030. And that is being put to good

effect as a 20mph or 30km/h default speed limit will become a focus of the UN's 6th Global Road Safety Week in May 17th to 23rd 2021. Expect a huge amount of support from UN, WHO, Road Safety Organisations and NGOs around the world.

But there's nothing in this glossy document about what is probably the most significant Road Safety initiative this century with the potential to save thousands of lives and limbs by 2030.

As stated in Section 1 of our Submission, there's a mammoth in the room and we are about to emulate the failures of the 2011 to 2020 NRSSP.

There's:

No Accountability
No Actions
No KPIs
No Responsibility

And the authors and those responsible will be nowhere near parliament in 2030.

Just lots of meaningless words.

We have left out many of the issues we would like in the document.

Most can be found in our Submission to the Joint Select Committee on Road Safety in July 2020.

It's way past time to stop kowtowing to the loudest voices and to <u>PUT PEDESTRIANS (ALL OF US) FIRST</u>

And it's time to step outside the Canberra Bitumen Bubble and re-write this meaningless "strategy"

Regards

Harold

Harold Scruby
Chairman/CEO

Pedestrian Council of Australia Limited
The Walking Class
Registered ACNC Charity No: 18075106286
Telephone: (02) 9968-4555 - [redacted]
Email: mail@walk.com.au - Internet: www.walk.com.au
PO Box 500 - NEUTRAL BAY NSW 2089 – AUSTRALIA - ABN 18 075 106 286

From: Pedestrian Council [mailto:pedestrian.council@gmail.com]
Sent: Monday, 23 November 2020 4:06 PM
To: '[redacted]
Subject: FORMAL COMPLAINT - RACS Trauma Committee Chair Webinar - Protecting vulnerable road users - except Pedestrians

PEDESTRIAN COUNCIL OF AUSTRALIA
Safety - Amenity - Access - Health
The Walking Class
Patron: Dame Quentin Bryce AD CVO

Mr Martin Small
Chairman
ACRS

Dear Martin

FORMAL COMPLAINT

It was good to see you at the launch of Road Safety Week in Sydney on Sunday 15 November.

As a member of the ACRS for over two decades, we wish to lodge a formal complaint regarding the Victorian Chapter's Protecting Vulnerable Road Users Webinar.

I don't know what is going on to cause this mega-myopia but it's hardly what you would expect from a so-called professional body purportedly concerned about the safety of "vulnerable road users".

On 28 October, we were invited to attend a Roundtable to be facilitated by Dr Julie Hatfield, Associate Professor at the University of NSW, and supported by the Australasian College of Road Safety

Minister Scott Buchholz and Pat Conaghan were in attendance

She opened the meeting by declaring that we would first hear from three representatives from cyclists and then three representatives from motor-cyclists and then we would hear from (quote): "other minority road user groups".

She actually allowed four representatives from cyclists to speak and then the three motor-cyclists. Two minutes each, totalling fourteen minutes.

Finally, way down the list, she allowed me to have two minutes and upon protest, most generously extended it to three.

They had invited no other groups to speak on behalf of pedestrians.

I let the meeting know of our displeasure.

So instead of listening and correcting our concerns, you allow the College to repeat the farce.

I don't need to tell you that pedestrians are by far the largest and most vulnerable road user group in Australia.

Just to put this in perspective, even if Cyclists and Motorcyclists represented all the data in "Other" below in this travel survey (which they don't), Pedestrians would still be around 20 times the number of Vulnerable Road Users travelling to work in Sydney:

https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts/household-travel-survey-1

TRAVEL MODE (Sydney 2018/2019)			
	Trips	**%**	
Vehicle Driver	210,000	16.3%	
Vehicle Passenger	54,000	4.2%	
Train	75000	5.8%	
Bus	62000	4.8%	
Walk Only	588,000	45.6%	
Walk Linked	254,000	19.7%	65.3%
Other	47,000	3.6%	3.6%
TOTAL	**1,290,000**	**100.00%**	

But your senior people in the Victorian Chapter don't even recognise that we exist.

Dr John Crozier, Chair RACS Bi-national Trauma Committee wrote to Dr Jeff Potter, Chapter Chair ACRS Victoria on 13 November, expressing his concerns (a copy of his email is below).

He suggested it would be prudent to include pedestrians.

After the launch of Road Safety Week, I was invited to have a drink with the two families who lost four children who were just going for a walk on a footpath (and another who was permanently brain damaged) in Sydney on 1 February this year.

https://www.abc.net.au/news/2020-02-03/family-of-driver-devastated-after-son-allegedly-killed-children/11925688

It's difficult to understand how these people can remain so decent and forgiving.

I wonder how they and all the other families whose loved ones have died (or been seriously injured) as pedestrians on Australia's roads and footpaths would feel to know that the RACS Trauma Committee is conducting a "Protecting vulnerable road users" webinar tomorrow and pedestrians have been excluded.

You really will have to question whether people should be in positions where they can make the College look so utterly ridiculous and out of touch.

Is it because these groups are so extremely vociferous that they have clearly lost the plot.

It's time for some heads to roll and a very serious apology to all the pedestrians of Australia

And a national webinar entirely focussed only on Pedestrian Safety (I can't see much about pedestrians and walking in your forthcoming webinars).

In the immortal words of our future monarch:

The whole of the 20th Century has always put the car at the centre.

In the 21st century, we must put pedestrians first.

Prince Charles

60 Minutes - Sunday 6 November 2005:

(Quote) "The whole of the 20th Century has always put the car at the centre, so by putting the pedestrian first, you create these liveable places, I think, with more attraction and interest and character and liveability."

Regards

Harold

Harold Scruby
Chairman/CEO

Pedestrian Council of Australia Limited
The Walking Class
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PO Box 500 - NEUTRAL BAY NSW 2089 – AUSTRALIA - ABN 18 075 106 286

From: Lyn Journeaux [mailto:Lyn.Journeaux@surgeons.org]
Sent: Friday, 13 November 2020 11:00 AM
To: ACRS Victorian Chapter
Cc: John Crozier; Harold Scruby; 'PCA'; Valerie Malka 1; [redacted]; Rebecca Clancy
Subject: Email from John Crozier, RACS Trauma Committee Chair Webinar - Protecting vulnerable road users

To: Dr Jeff Potter, Chapter Chair ACRS Victorian Chapter

Dear Dr Potter

We were pleased to see the ACRS Victorian chapter tackle vulnerable road users in the first of the six series of road safety webinars with 'Protecting Vulnerable Road Users' on 18 November.

However, we are concerned that pedestrians, the most vulnerable group of road users, are not included. Whilst cyclists and motorcyclists are indeed susceptible, a title such as 'Protecting cyclists and motorcyclists – vulnerable road users' would be a more accurate reflection. Alternatively, inclusion of pedestrians in this webinar would be prudent.

with best wishes
John Crozier
Chair RACS Bi-national Trauma Committee

From: ACRS Victorian Chapter <victorianchapter@acrs.org.au>
Sent: Tuesday, 10 November 2020 3:39 PM
To: Lyn Journeaux <[redacted]>
Subject: Webinar - Protecting vulnerable road users

View this email in your browser

Protecting vulnerable road users webinar

The ACRS Victorian Chapter, AITPM and **RACV** have come together to offer an online road safety webinar series. This series is relevant for all practitioners across the country. There are six sessions and each will explore the steps needed to move closer towards zero lives lost or seriously injured on the road.

We will hear from strategists and practitioners about their experiences and they will offer solutions the industry needs to implement in order to create a safer system to eliminate trauma from the road network.

Please join us for the first event of this series that will will focus on cyclists and motorcyclists. We will hear from **Dr Marilyn Johnson of the Amy Gillett Foundation** and **Kenn Beer, Principal Engineer of Safe System Solutions.**

Wednesday 18 November, 2020

12.30-1.30pm

Use the code **ACRSVICS01-06** for free access

register now

Dr Marilyn Johnson is one of Australia's leading cycling safety research experts. She is a Senior Researcher at the Monash University Institute of Transport Studies where she leads the Active Transport and Micro-Mobility group.

Marilyn is also the Research and Policy Manager at the Amy Gillett Foundation and was a major contributor the national campaign, *a metre matters* that changed the road rules to improve safety when drivers and cyclists share the roads in Australia.

Kenn Beer is recognised as a world leader in motorcycle safety infrastructure. He has been an advisor to governments of Australia, New Zealand, the Philippines, Thailand and the USA (California and Colorado) on the topic. He managed the Victorian Motorcycle Safety Levy infrastructure program that reduced fatal and serious injuries for motorcyclists. Kenn is a licenced motorcycle rider, accredited senior road safety auditor, qualified trainer and assessor, registered engineer and passionate road safety advocate.

☐ ACRS membership ☐ AITPM membership ☐ RACV newsletter

Not an ACRS member?

Now is the perfect time to join ACRS and get access the whole event series.
The benefits of an ACRS membership include:

- Membership of a progressive organisation that encourages communication, networking, professionalism and advocacy across all levels of road safety – policy makers, academics, community organisations, researchers, federal, state and local government agencies, private companies and members of the public

- Member discounts to national and international road safety conferences & events, such as the next Australasian Road Safety Conference
- Weekly e-newsletters(the ACRS Weekly Alert) summarising road safety issues of national and international importance
- A quarterly ACRS Journal containing peer-reviewed research and latest news in the road safety sphere
- International recognition of road safety excellence via prestigious Fellowships & Awards
- Access to state and regional Chapters, including the ability to contribute to road safety goals via Committee representation at the Chapter, national and/or international level
- Networking with road safety professionals from all sectors of the field
- Professional Development

Become an ACRS member

Next in the series - Registration details coming soon

Wednesday 25 November - Improving road infrastructure and setting safe speed limits
Rob McInerney - CEO at iRAP and Blair Turner - World Bank

Wednesday 2 December – Eliminating post-crash care, identifying system failures
Dr John Crozier, Chair at National Trauma Committee Royal Australasian College of Surgeons and Michael Fitzharris, Associate Professor, Monash University

Wednesday 10 February – Addressing risky behaviour and avoiding the aftermath
Dr Jeremy Woolley, Director for Centre for Automotive Safety Research, University of Adelaide and Martin Small, Leading road safety management consultant, Royal Automobile Association of South Australia

Wednesday 17 February – Driving vehicles without safety options, safety is required

Jessica Truong - Vice President of Programs Towards Zero Foundation, Director at Global NCAP

Wednesday 24 February – Embedding safety in work culture

Jerome Carslake - National Road Safety Partnership Program

Contact us

AITPM - danielmustata@roadsolutions.com.au

ACRS - victorianchapter@acrs.org.au

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ACRS Victoria Chapter · 485 Bourke Street · Melbourne, Vic 3000 · Australia

Why Australian road rules should be rewritten to put walkers first

Cut any confusion and put walkers first, says transport professor David Levinson.

The Conversation

January 7, 2021

If a vehicle was coming through this intersection would this pedestrian have right of way?
Stephen Di Donato/Good Free Photos

David Levinson, *University of Sydney*

You are walking east on a footpath and come to an unmarked intersection without traffic signals. A vehicle is driving north, across your path. Who has right of way in Australia?

Should you step onto the road expecting the vehicle to slow down or stop if necessary? Is the driver legally obliged to do so?

And does the driver see you? How fast is the vehicle going? Can it stop?

Now imagine you are the driver. What will the person on foot do next?

So the answer to the question of 'giving way' is complicated. It depends on the speed of the car, how fast the person is walking, how quickly the driver reacts to apply the brakes, the vehicle itself, road conditions and how far the car and walker are from each other. Ideally, both the driver and walker can assess these things in a fraction of a second, but human perception and real-time calculation skills are imperfect. At higher speeds, both pedestrians and drivers underestimate vehicle speed.

Soon we will have to seriously consider autonomous vehicles, which can assess distance and speed almost perfectly, but there is still that ambiguity.

Driverless vehicles and pedestrians don't mix. So how do we re-arrange our cities?

What does the law say?

Road rules legislate how drivers should behave. But it turns out most people do not know right-of-way rules.

In Australia, the National Transport Commission recommends model rules, which each state adopts and lightly modifies. For instance, New South Wales Road Rules 72, 73 and 353 cover pedestrians crossing a road.

Rule 353 says:

> If a driver who is turning from a road at an intersection is required to give way to a pedestrian who is crossing the road that the driver is entering, the driver is only required to give way to the pedestrian if the pedestrian's line of travel in crossing the road is essentially perpendicular to the edges of the road the driver is entering – the driver is not required to give way to a pedestrian who is crossing the road the driver is leaving.

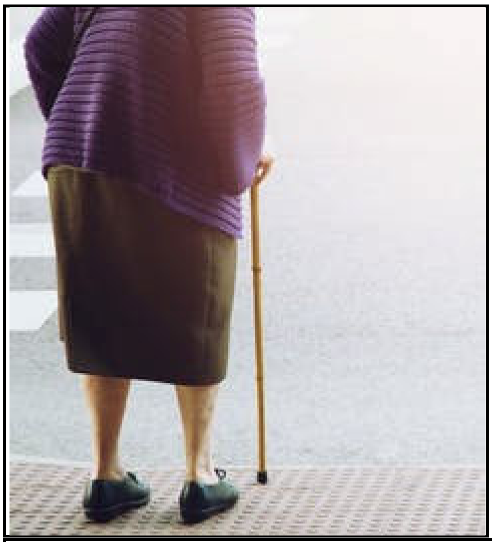
Because of the legal principle of duty of care, drivers must still try to avoid colliding with pedestrians. They have a legal obligation to not be negligent. Thus, they must stop if they can for pedestrians who are already there, but not those on the side of the road wanting to cross.

However, this element of the NSW Road Transport Act is not made explicit in the NSW Road Rules. There is no statutory requirement in the road rules or elsewhere to give way to pedestrians other than as set out specifically in the road rules.

In contrast, NSW Road Rules 230 and 236 explicitly require pedestrians to avoid behaving dangerously around cars.

The published advice in NSW is:

> Drivers must always give way to pedestrians if there is danger of colliding with them, however pedestrians should **not** rely on this and should take great care when crossing any road.



Does a slow-moving person's higher risk of being hit mean they can't cross the road? Shutterstock

This statement is not supported by any road rule or other law.

Does the law as written mean a slow-moving person can never cross the street because of the risk of being hit? Only because duty-of-care logic indicates both the driver and pedestrian should yield to the other to avoid a collision is it possible for this person to cross without depending on the kindness of strangers. But the law gives the benefit of doubt to the driver of the multi-ton machine. Existing road rules permit drivers to voluntarily give way, or not.

Keep in mind the asymmetry of this situation. A person walking into the side of the car is silly. A car being driven into the side of a person, as happens 1500 times a year in NSW, is life-threatening.

Pedestrian safety needs to catch up to technology and put people before cars

What do we recommend?

The UK Manual for Streets presents a street user hierarchy that puts pedestrians at the top. That is, their needs and safety should be considered first.

Consider first	Pedestrians
↓	Cyclists
	Public transport users
	Specialist service vehicles (e.g. emergency services, waste, etc.)
Consider last	Other motor traffic

A recommended hierarchy of street users.
Manual for Streets/UK Department for Transport

Walking has multiple benefits. More people on foot lowers infrastructure costs, improves health and reduces the number in cars, in turn reducing crashes, pollution and congestion. However, the road rules are not designed with this logic.

The putative aim of road rules is safety, but in practice the rules trade off between safety and convenience. The more rules are biased toward the convenience of drivers, the more drivers there will be.

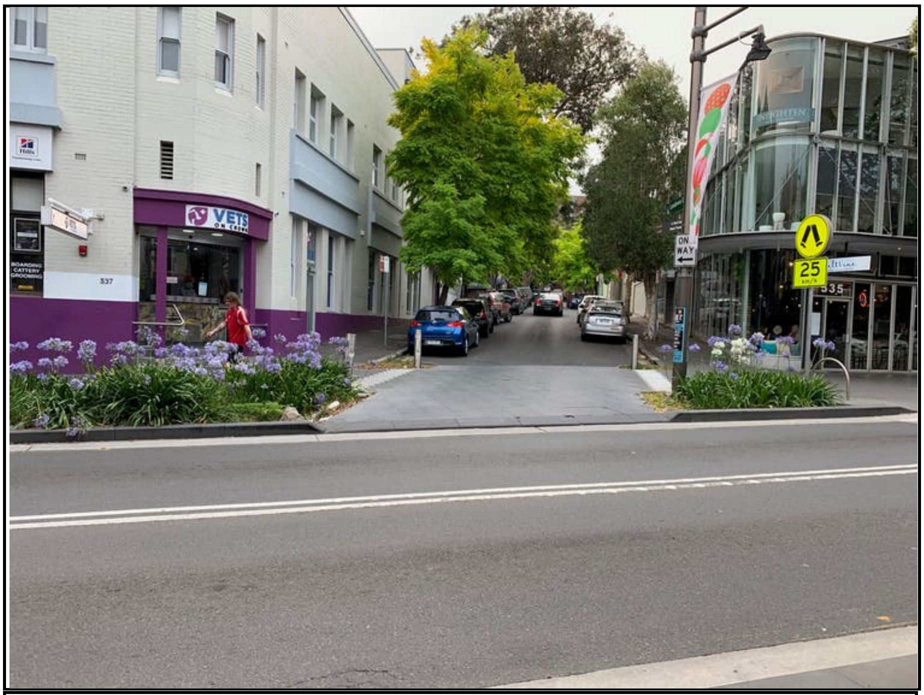
How traffic signals favour cars and discourage walking

Yet public policy aims to promote walking. To do so, pedestrians should be given freer rein to walk: alert, but not afraid.

Like many things in this world, intersection interactions are negotiated, tacitly, by road users and their subtle and not-so-subtle cues. Pedestrians should have legal priority behind them in this negotiation.

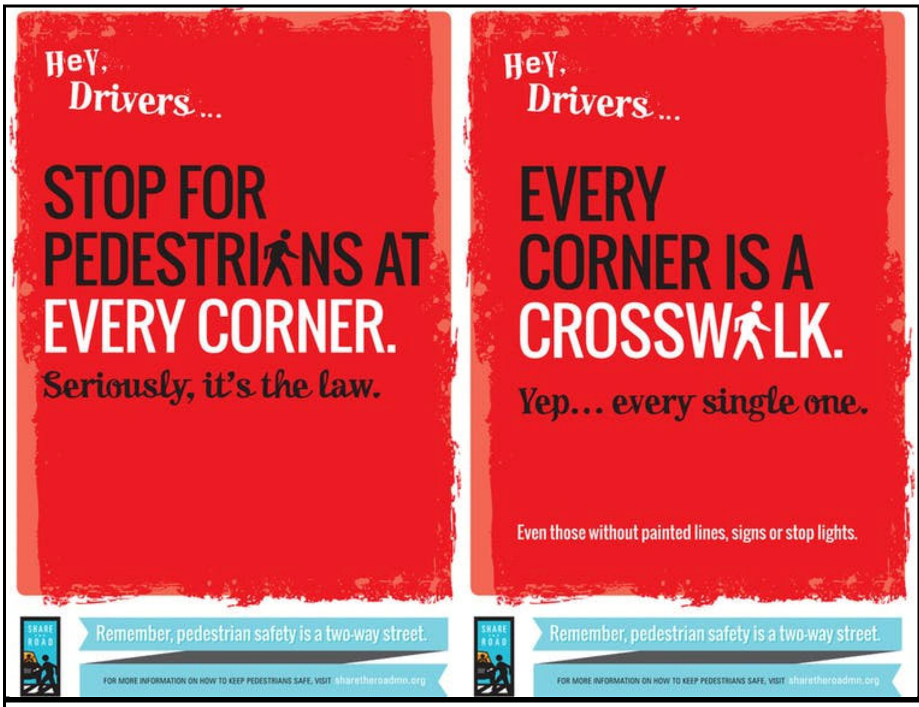
The road rules need to be amended to require drivers to give way to pedestrians at all intersections. We favour a rule requiring drivers to look out for pedestrians and give way to them on any road or road-related area. In the case of collisions, the onus would be on drivers to show they could not in the circumstances give way to the pedestrian.

We believe all intersections without signals -whether marked, courtesy, or unmarked -be legally treated as marked pedestrian crossings. (It might help to mark them to remind drivers of this.) We should think of these intersections as spaces where vehicles cross an implicit continuous footpath, rather than as places where people cross a vehicular lane.



At this intersection in Surry Hills, NSW, vehicles cross a continuous footpath.
Photo by David Levinson., Author provided

This change in perspective will require significant road user re-education. Users will have to be reminded every intersection is a crosswalk and that pedestrians both in the road and showing intent to cross should be yielded to, whether the vehicle is entering or exiting the road. We believe this change will increase safety and willingness to walk, because of the safety-in-numbers phenomenon, and improve quality of life.



In Minnesota, every corner is a crosswalk, marked or not, so stopping for pedestrians at intersections is mandatory, whatever direction the car is moving.
Minnesota Department of Transportation., Author provided

Drivers should assume more responsibility for safety

People should continue to behave in a way that does not harm themselves or others. People on foot should not jump out in front of cars, expecting drivers to slam on their brakes, because drivers cannot always stop in time.

Nothing to fear? How humans (and other intelligent animals) might ruin the autonomous vehicle utopia

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Similarly, drivers should be ready to slow or stop when a person crosses the street, at a crosswalk or not. But the law should be refactored to give priority to pedestrians at unmarked crossings. This will reduce ambiguity and make drivers more alert and ready to slow down.

In tomorrow's world of driverless and passengerless vehicles, the convenience of drivers becomes even less essential. If someone is crossing the road, most of us probably believe a driverless vehicle should give way to ensure it doesn't hit that person for two reasons: legally, to avoid being negligent; and morally, because hitting people is bad, as identified in many examples of the Trolley Problem.

Further, we should think more like the Netherlands, where vehicle-pedestrian collisions are presumed to be the driver's fault, unless it can be clearly proven otherwise.

The everyday ethical challenges of self-driving cars

This article examined a few of 353 distinct road rules. Many others affect pedestrians and should also be re-examined.

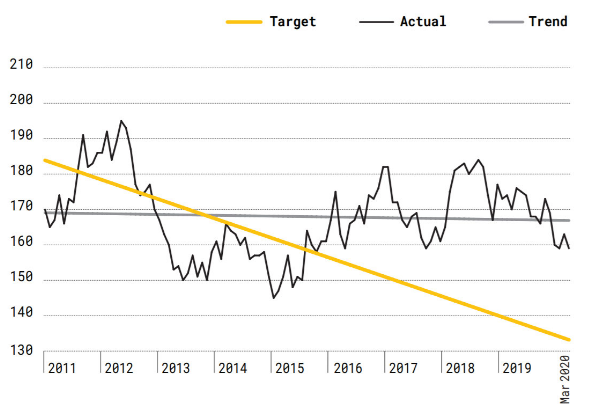
This article was extensively edited by Janet Wahlquist of WalkSydney and extends some ideas developed as part of Betty Yang's undergraduate thesis, but the text is the sole responsibility of the author.

David Levinson, Professor of Transport, *University of Sydney*

PEDESTRIAN COUNCIL OF AUSTRALIA
Safety - Amenity - Access - Health
The Walking Class
Patron: Dame Quentin Bryce AD CVO

Joint Select Committee on Road Safety – PCA Submission

Pedestrians fatalities per annum



SUMMARY

1 - ACCIDENTS (a Major Misnomer)
2 - TOWARDS ZERO – THE NEVER ENDING STORY
3 - MOBILITY VS ROAD SAFETY
4 - THE 2011 TO 2020 ROAD SAFETY STRATEGY
(an abject failure – please don't repeat the mistakes of the past)
5 - ALCOHOL AND OTHER DRUGS
6 - SCHOOLZONES
7 - BULLBARS AND FRONTAL PROTECTION SYSTEMS
8 - DRIVER DISTRACTIONS
9 - PEDESTRIAN DISTRACTION
10 - SHARED ZONES AND SHARED PATHS (and the E-Scooter scourge)
11 - 30KM/H ZONES – PEDESTRIAN CROSSINGS AT ROUNDABOUTS – COUNTDOWN TIMERS ON THE WAIT PHASE – SCRAMBLE CROSSINGS - 10 KM/H SHARED ZONES FOR ALL PUBLIC AND PRIVATE CARPARKS
12 - WORK ZONES
13 - PARKING ENFORECEMENT

Calendar year	Driver	Passenger	Pedestrian	Motorcyclist	Cyclist	Australia
2008	670	303	189	245	28	1,437
2009	707	333	196	224	31	1,491
2010	636	284	170	224	38	1,353
Baseline[1]	**671**	**307**	**185**	**231**	**32**	**1,427**
2011	568	286	186	202	34	1,277
2012	610	260	170	223	33	1,300
2013	557	204	158	213	50	1,187
2014	533	228	151	191	45	1,151
2015	555	251	161	203	31	1,204
2016	622	208	182	249	29	1,292
2017	566	234	161	211	39	1,221
2018	522	204	177	191	35	1,135
2019	577	205	160	211	39	1,195
12 months to Apr-2020	557	188	156	186	45	1,135
Apr-2020 % change to baseline	**-17.0%**	**-38.8%**	**-15.7%**	**-19.5%**	**40.6%**	**-20.5%**

Source: Australian Road Deaths database as at 14-May-2020

Road death figures sourced from the Australian Road Deaths Database are preliminary and subject to revision. They are provided here as a provisional indication of progress. The source for formal reporting on progress against the National Road Safety Strategy is the National Crash Database, updated annually—see Safety Performance Indicators.

From: PCA [mailto:walking@walk.com.au]
Sent: Friday, 14 February 2020 7:20 PM
To: 'gerry.mcinally@aph.gov.au'
Subject: Submission to Joint Select Committee on Road Safety

PEDESTRIAN COUNCIL OF AUSTRALIA
Safety - Amenity - Access - Health
The Walking Class
Patron: Dame Quentin Bryce AD CVO

Mr Gerry McInally
Joint Select Committee on Road Safety

Dear Mr McInally and the Joint Select Committee

Thank you very much for granting us an extension for our submission.

Pedestrians are the largest and most vulnerable road user group and I’m certain the Committee will want to hear our voice.

The PCA is a Registered Australian Charity.

Our objectives are the continuing improvement of the Safety, Amenity, Access and Health of pedestrians throughout Australia.

You can learn more about our board and structure here:

https://www.walk.com.au/pedestriancouncil/page.asp?PageID=105

1 - ACCIDENTS (a Major Misnomer)

In January 2016, Nevada enacted a law to change “accident” to “crash”.

In 2014, New York City adopted a policy that states the city “must no longer regard traffic crashes as mere accidents”.

And at least 28 US state departments have moved away from the word “accident” when referring to crashes.

Over 90% of deaths and serious injuries on Australian roads are caused by road users who break the law.

Calling them “accidents” rather than “incidents” or “crashes” only helps to exonerate the perpetrators.

And it allows politicians and those accountable to deny responsibility, because being “accidents”, they were effectively unavoidable.

There may be those who will argue against this vital and fundamental change, possibly those agencies like MUARC and TAC Victoria and the MAC in South Australia, etc., but it’s now clearly time to banish “accident/s” from the road safety lexicon.

2 - TOWARDS ZERO

In 1997, Claes Tingvall and Narelle Haworth of the Monash University Accident Research Centre presented a paper promoting the idea of “Vision Zero”. It is a philosophy of road safety that eventually no one will be killed or seriously injured within the road transport system.

In Australia it has since morphed into “Towards Zero”. Millions of dollars have been poured into promoting this idea across Australia.

In our view, as stated in my Opinion piece published in The Telegraph on 4 February 2020 (copy attached), it is (quote):

https://www.dropbox.com/s/x4zreppupsc3ia6/Telegraph%20-%20Opinion%20-%2002%20BAC%20Digital%20Version%20-%20200204.pdf?dl=0

“probably the most nebulous, meaningless campaign ever conceived in Australia: “Towards Zero”. Which sounds great in theory, except that there is no commitment as to the “when”.

It’s like floating a public company whose objective is “Towards Profit”.

And it allows those responsible to be “unaccountable” for our road trauma because “tomorrow never comes”.

We may as well call it “Towards Nothing”, because the word “towards” means we never get there. (see my SMH OpEd “Towards Nothing”):

https://www.dropbox.com/s/ixn013uetkcbizq/SMH%20-%20Opinion%20-%20Towards%20nothing%20-%20the%20sorry%20fate%20of%20a%20road%20safety%20summit%20-%20200528A.pdf?dl=0

However, Transport Ministers signed up to 2050 at the COAG TIC Meeting last November and notably used the word “vision” NOT “towards”.

"MAKING OUR ROADS SAFER - Building on the findings from the Inquiry into the National Road Safety Strategy, Council committed to the framework for the next National Road Safety Strategy and positioning Australia to achieve the <u>vision</u> zero target by 2050. “

An interim step could be to halve our deaths and serious injuries by 2030 emulating this British campaign called HALVE OUR ROAD DEATHS AND SERIOUS INJURIES BY 2030 or 50BY30:

And also embrace an agreed and defined target date and with a logo/campaign such as ours - 2050 VISION-ZERO:

3 - MOBILITY VS ROAD SAFETY

In most jurisdiction, the roads authorities have a dual role. They are in charge of improving traffic flow (mobility) and road safety (reducing the road toll)

The PCA started in 1995 because we found it so difficult to get a 40 km/h Schoolzone on a "main road".

This became the first such zone in Australia. The roads authority was totally opposed because it would "slow the traffic down" ...

https://www.walk.com.au/pedestriancouncil/page.asp?PageID=189&SiteID=1

Parents get their lucky brakes

Sydney Morning Herald

Thursday 9 March 1995

Slow motion ... parents and children protest outside Middle Harbour Public School, Mosman.

Parents get their lucky brakes

By COL ALLISON

Campaigners trying to protect the lives of children won a victory yesterday when a temporary speed limit was authorised outside a primary school.

For years, teachers and parents of pupils at Middle Harbour Public School, led by the former Deputy Mayor of Mosman, Mr Harold Scruby, have been concerned for the safety of children crossing busy MacPherson Street.

Worried that a child was going to be injured or killed by cars speeding through a crossing to the school, they have taken on the Roads and Traffic Authority (RTA), NRMA and the police.

Yesterday morning campaigners, accompanied by the Liberal MP for Willoughby, Mr Peter Collins, took to the streets in a placard-waving protest.

Concern ... Mr Collins, left, Mr Scruby and Mr Baird.

Their quest has been a long one. In 1990, residents asked for a speed camera to be installed near the traffic lights to slow motorists. Police said yes, but were overruled by the RTA and NRMA on the local traffic committee. Mosman Council agreed to pay for the camera, but the answer was still no.

The area was not a "black spot" – no-one had been killed there.

In June last year, Mr Scruby unsuccessfully urged the Minister for Transport, Mr Baird, to create a 40km/h speed zone outside the school during classroom hours, where traffic lights did not deter speeding motorists who often ran the red lights.

But even if a 40km/h zone is placed outside the school, the NSW police are powerless to enforce the speed limit. Mr Brad Hazzard, chairman of Staysafe, the Parliamentary Joint Standing Committee on Road Safety, said that under a Commissioner's Direction, police can't operate down-the-line radar units, slant radar units or speed cameras within 200 metres of a speed change – and most school zones are not long enough.

However, Mr Collins said last night that Mr Baird had authorised a 40km/h zone to be established outside Middle Harbour School – on a 12-month trial.

It was also confirmed by the Police Traffic Operations late yesterday that a review of the commissioner's directions on policing 40km/h zones was under way in school areas throughout the State.

In practically every jurisdiction, they have complete authority of speed limits, pedestrian crossings and traffic lights.

In the Sydney CBD for example, traffic lights are controlled by motor vehicles (6% of the road users) passing over magnetic strips in the road.

During working hours, the buttons “controlling” the traffic lights are deactivated for the 92% of road users – pedestrians.

It took the PCA 16 years of advocacy to get the authorities (the RTA/RMS and City of Sydney) to reduce the speed limit from 50 km/h to 40 km/h.

https://www.walk.com.au/pedestriancouncil/page.asp?PageID=544&SiteID=1

Mobility ALWAYS takes precedence over Traffic Flow.

Commerce generally wins over Road Safety.

A good example is the Green on Green or Double Green traffic light system

As you can see , the coroner called for this outrageous anomaly to be fixed in 2014, where innocent pedestrians have been killed due to the “more cars faster” culture at the RTA/RMS

https://www.dailytelegraph.com.au/news/nsw/bus-death-inquest-coroner-calls-for-pedestrian-crossings-upgrade-in-wake-of-mijin-shins-death-at-beecroft/news-story/d9d15030b28f133bfcc72a7c7f21fbe9

Ms Freund said the RMS should "prioritise and implement the installation of traffic signal delay phasing so that vehicle traffic be held on a red light while a green walk sign permits pedestrians to leave the footpath unimpeded for a period of time".

In its submissions to the inquest, the RMS opposed this proposal saying it would cost $5 million and would take three years to complete the upgrade.

But Ms Freund dismissed their submission, saying the safety of pedestrians was paramount.

"A pedestrian, particularly a child or a smaller person like Mijin being caught in a moving blind spot of a larger vehicle like a bus or truck, or the now-common SUV's and four-wheel drives, can clearly, as demonstrated here, have tragic and irreversible consequences."

Yet another woman was killed at Crow's Nest in Sydney because of yet another Green on Green set of traffic lights, last May

https://www.dailytelegraph.com.au/news/nsw/grieving-family-calls-for-action-to-keep-pedestrians-safe/news-story/be7a00e33e73d86562266c136f61fede

These road authorities have an imperative to improve traffic flow.

We believe state and territories should look more at the Victorian model with VicRoads and the TAC

These third party government insurance agencies have an economic imperative to reduce claims (road injury costs)

If we are to reduce road trauma, it's vital we think differently.

We should be looking at separate ministries for Traffic Management and Road Safety, especially where the Insurance Agencies have an equal voice and Safety becomes equally as important as Mobility.

4 - THE 2011 TO 2020 ROAD SAFETY STRATEGY (an abject failure – please don't repeat the mistakes of the past)

Attached is a copy of my Opinion piece of November 2016 regarding the NSW Point to Point Speed Camera fiasco.

https://www.dropbox.com/s/i7km6aif2ko001x/SMH%20-%20Opinion%20-%20Comment%20-%20Gay%20-%20P2P%20Speed%20Cameras%20-%20161114%20-%20Ed.%20HiLitepdf.pdf?dl=0

Also attached is a copy of our submission to the Senate Road Safety Inquiry, in March 2015, primarily on this matter.

https://www.dropbox.com/s/mqdico9luj1v0yy/Senate%20Road%20Safety%20sub58_PCA%20March%202015.pdf?dl=0

Five years later, the only thing that has changed is the date.

Please view my address to the DPM the Hon Michael McCormack at the Launch of the Inquiry into the National Road Safety Strategy 2011 to 2020

https://youtu.be/QPkD6ZbCMEo

This was mainly about requiring NSW to comply with its written commitment (signed by Minister Duncan Gay in May 2011) to book ALL motorists who were captured deliberately speeding in Point-to-Point Speed Camera zones.

It remains one of the most disgraceful and immoral decisions in Road Safety we have witnessed in 25 years.

Up until 2016 at least 16 people died in these zones due to speed related crashes. Most could be alive today had the government "simply "flicked a switch" (see attached article Daily Telegraph January 2018)

https://www.dropbox.com/s/phpyrdtgkhaou9t/Telegraph%20-%20Flick%20switch%20to%20save%20lives%20-%20180106.pdf?dl=0

The DPM responded on 13 September 2018 (quote) " ... insofar as point to point technology is concerned and turning it on, that would be a good start."

There is absolutely no point in having another NRSSP 2020 to 2050, when the Commonwealth cannot require the States and Territories to comply with their written and signed commitments.

It would be an utter farce. A joke. Based on the experience and results of the NRSSP 2011 to 2020 (see AAA Benchmarking Report Q4 2019 attached).

https://www.dropbox.com/s/w4s7cd5xrdvhwsg/AAA%20Benchmarking%20Report%20Q4%202019.pdf?dl=0

There MUST be a "carrot and a stick" system in place which rewards jurisdictions for complying with the NRSSP objectives and set milestones, and penalises those jurisdictions which do not comply.

5 - ALCOHOL AND OTHER DRUGS

The tragedy of two weeks ago when 7 children were hit while walking on a footpath in Sydney (four killed – two seriously injured) by an alleged drunk-driver drew the attention and sympathy of the media and most Australians, especially as three of the children were from the same family.

The Telegraph asked me to write an Opinion piece on the catastrophe.

A copy is attached.

https://www.dropbox.com/s/x4zreppupsc3ia6/Telegraph%20-%20Opinion%20-%2002%20BAC%20Digital%20Version%20-%20200204.pdf?dl=0

Essentially, I was making the case, evidence based, for emulating Norway's approach to drink-driving.

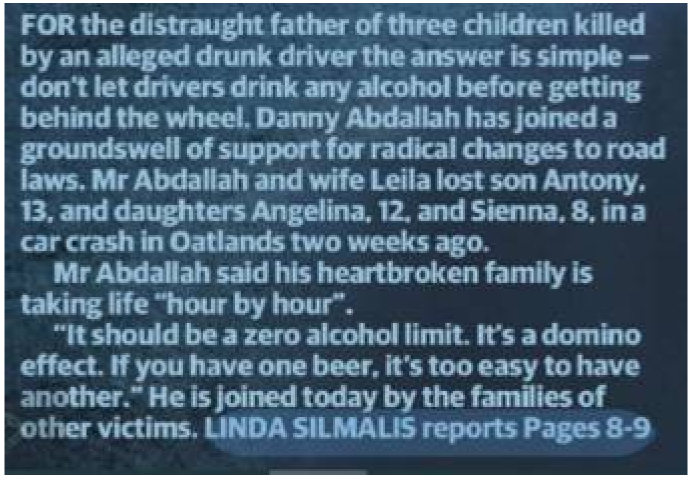
I also pointed out that great changes to road safety law and interventions have followed tragedies.

I concluded:

But where we differ is that we believe we can minimise the behaviour by copying Norway's BAC laws and penalties.
As in Norway, few people even risk one drink, knowing the consequences. The culture is quite the opposite here.
The lives of these four young children must not be in vain. Now is the time to emulate Norway,
grab the moment and reduce the maximum BAC to .02 per cent … across the nation.
Gough Whitlam once famously quipped: "Politicians are like rowers … they face one way and go the other."
With the help of the media, this horrific disaster can get them facing in the right direction.
We beg politicians across Australia to call a national symposium, to honour these young children
and all those killed and injured by inebriated drivers.
We need to be a lot more Nordic.

Propitiously, according to the front page of the Sunday Telegraph 16/2/20 (copy attached), the father of the three children who were killed is now calling for a Zero (BAC) Limit.

https://www.dropbox.com/s/6re0nouoawp002q/Sunday%20Telegraph%20-%20BAC%20Zero%20-200216.pdf?dl=0



FOR the distraught father of three children killed by an alleged drunk driver the answer is simple — don't let drivers drink any alcohol before getting behind the wheel. Danny Abdallah has joined a groundswell of support for radical changes to road laws. Mr Abdallah and wife Leila lost son Antony, 13, and daughters Angelina, 12, and Sienna, 8, in a car crash in Oatlands two weeks ago.

Mr Abdallah said his heartbroken family is taking life "hour by hour".

"It should be a zero alcohol limit. It's a domino effect. If you have one beer, it's too easy to have another." He is joined today by the families of other victims. LINDA SILMALIS reports Pages 8-9

Now is the time to mobilise all in Road Safety to campaign for this major, life-saving change.

But the sleeper is illicit drugs.

Police tell me that they now average one driver over the limit out of every 250 roadside tests.

But they average one in ten when they test for illicit drugs.

And they can only test for half the known illicit drugs.

The Commonwealth Government must invest significant dollars in developing the technology to teat for ALL known illicit drugs and the states and territories must invest in drug buses and paying for more police patrols.

This is an epidemic.

6 - SCHOOLZONES

In Australia we all have NINE “Railway Gauges” in our DNA. By this I mean, that the more we try to do things the same, the more we break away.

In 1999 we proclaimed the Australian Road Rules. The main objective was so that we could all drive under the same Rules and Regulations, no matter where we were in Australia.

Since then we have done everything to be different.

Schoolzones is a classic example.

Attached is a copy of our Media Release of May 2018.

https://www.dropbox.com/s/1ft516p49av7cus/Media%20Release%20-%20School%20Zones%20%20-%20180508pdf.pdf?dl=0

It shows that the rules and regulations in schoolzones are different in every state and territory.

School zones range from a blanket 25km/h when children are present in South Australia (if children are "present: and in school uniform), to as high as 80km/h in Queensland on roads where
the original limit is 110km/h.

This is a disgrace and it’s untenable.

"Speed Limits and Time Zones are only two safety factors - most motorists are least likely to offend with tougher penalties. NSW leads Australia in penalties. It must always be remembered that non-enforcement encourages non-compliance."

STATE	Speed limit	School speed zone times
NSW	40km/h	8 to 9.30am, 2.30 to 4pm on notified school days.
VIC	40km/h, and 60km/h when the original speed limit is 80km/h or higher	Several types of school speed zones, including: - permanent 40km/h zones - time-based zones (8–9.30am and 2.30–4pm on school days) - variable speed limit zones (where speed limits are shown using electronic signs)
QLD	40km/h on roads where the limit is 50km/h, 60km/h or 70km/h 60km/h on roads where the limit is 80km/h 60km/h or 80km/h on roads where the limit is 90km/h or 100km/h, depending on the amount of school related activity on or near the road 80km/h on roads where the existing limit is 110km/h.	7-9am, 2-4pm, school days
TAS	40km/h	8am–9.30am and 2.30pm–4pm, school days
SA	25km/h	Any time when a child is present and in the zone. A child is any person less than 18 years of age and includes a student of any age wearing school uniform.
ACT	40km/h	8am-4pm
WA	40km/h	7:30–9am and 2:30–4pm
NT	40km/h	7.30am-5pm

And in South Australia, the Schoolzone speed limit also breaches the Austroads Guidelines which require that Speed Limits are in steps of 10 km/h and end in ZERO and Advisory Speeds are in steps of 10 km/h and end in FIVE

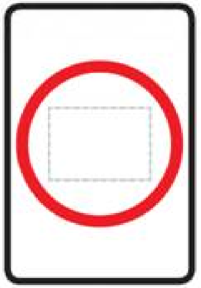
2.1.1 Speed limits and speed zones

A speed limit is the number shown on the regulatory speed limit sign (Figure 2.1) within the red circle (annulus) and defines the maximum legal speed permitted along a specific section of road under good road and travel conditions. The *Road Transport (Safety and Traffic Management) Act 1999* authorises the RTA to set the speed limits on NSW roads through traffic regulations. The RTA has not delegated this authority to any other agency and is therefore responsible for setting speed limits on all roads – State, regional and local.

A speed limit, displayed by the regulatory speed limit sign, is legally enforceable under the NSW Road Rules. According to NSW Road Rule 20, a driver must not drive at a speed over the speed limit applying to the driver for the length of road.

A speed zone is a length of road over which a particular speed limit applies. Speed zones are signposted to clearly define where the speed limit applies, with signs at the start, reminder signs within the zone (if required) and signs at the end showing the speed limit of the next zone.

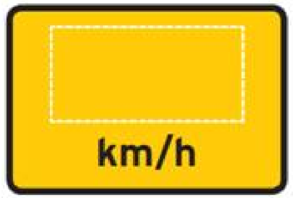
FIGURE 2.1 REGULATORY SPEED LIMIT SIGN (R4-1)



Other types of speed limit signs are Advisory Speed Limits (W8-2 on yellow background) and Speed Restriction Ahead sign (G9-79 with black circle); see *Figure 2.2* and *Figure 2.3*. They are not legal speed limits and are used to inform motorists of forthcoming changes in alignment and speed limits. For more information, see *Section 2.2.7* and *3.3.3 (b)*, respectively.

All regulatory speed limits are in steps of 10 km/h, always ending in 0. All advisory speed limits are in steps of 10, always ending in 5.

FIGURE 2.2 ADVISORY SPEED LIMIT SIGN (G9-79)



Ironically, NT which until recently had the only unlimited speeds on undivided roads in the western world, is the jurisdiction with the most commendable rules.

There is even an argument for 30 km/h Schoolzones (as in some parts of Europe) with the slogan: 7 to 5 Ensure they Survive.

In 2010, the NSW Auditor-General conducted a thorough review of schoolzones in NSW (see the report and his Media Release attached)

https://www.dropbox.com/s/jvwwi0gha2gvel5/NSW%20Audit%20Office%20%20Media%20Release%20%20Schoolzones%20%20100225%20-%20HiLite.pdf?dl=0

In a damning conclusion he stated:

Mr Achterstraat summarised the report by stating:

> "The future of our country and our society lies with our children. NSW motorists must understand the risk they pose to our children if they speed around schools. We need to ensure that motorists know when and where they should slow for school zones, but if that doesn't work there is no alternative but to get tougher. Ninety-nine per cent of school zones don't have speed cameras, and that's why I have asked the RTA to tell the public what has happened to the mobile speed cameras that the Minister promised in 2006 would be rotated between school zones."

In another damning finding he stated:

https://www.dropbox.com/s/blttsrqzr0d85f9/NSW%20Audit%20Office%20Schoolzones%20Report%20100225%20Parking%20Highlight.pdf?dl=0

Unsafe parking Unsafe parking may also contribute to the hazards around schools, and illegal and unsafe parking can be routinely observed in many school zones. Most councils do little or no enforcement of parking restrictions in NSW school zones.

There is little doubt that the other jurisdictions are not much different.

As stated by the NSW A-G: "The future of our country and our society lies with our children."

In NSW we have by far the highest penalties for driving offences in schoolzones – one third higher $$$ and an additional Demerit Point.

For all parking offences in schoolzones, again an additional one third higher $$$ penalties and TWO demerit points.

NSW is the only jurisdiction in Australia and we believe the world, where there are demerit points for illegal parking in schoolzones.

Unfortunately, the enforcement does not match the penalties.

The Joint Select Committee should conduct an urgent and separate inquiry into schoolzones alone.

For one of the best videos on Schoolzones, Tara Brown conducted extensive research around 2002 on A Current Affair.

It's a MUST WATCH and covers much of the behaviour of children and motorists around schools.

https://youtu.be/IeLH_RArhuU

7 - BULLBARS AND FRONTAL PROTECTION SYSTEMS

In 2006, all EU Countries banned bullbars on new cars. It was estimated that it would save 140 deaths and 1500 injuries among British pedestrians and cyclists each year.

The Sydney Morning Herald

6 Drive Jun 3, 2005

SHORT CUTS

NO BULL

Installing bull bars on new cars will be banned in all EU countries next January. Britain's Transport Research Laboratory estimates the legislation, passed last week, will prevent almost 140 deaths and more than 1500 injuries among British pedestrians and cyclists each year.

In September 2006, the SA Motor Accident Commission issued the following Media Release entitled:

METAL BULL BARS ARE BAD NEWS FOR PEDESTRIANS ...

https://www.dropbox.com/s/7yw42yzzar43yz5/Media%20Releases%20-%20Frontal%20Protection%20-%20AAA%20-%20ANCAP%20-%20RACS%20-%20BicycleNSW-%20Feb-Mar%202011.pdf?dl=0

MOTOR ACCIDENT COMMISSION

Level 12, 50 Pirie Street
ADELAIDE SA 5000

Media Release

14 September 2006

Metal bull bars are bad news for pedestrians

A major study by the University of Adelaide's Centre for Automotive Safety Research (CASR) has found that metal bull bars fitted to four wheel drive vehicles increase the risk of serious injuries to pedestrians.

On Thursday 14 September the Minister for Road Safety, The Hon. Carmel Zollo MP, will launch a demonstration where pedestrian head impacts will be simulated by dropping watermelons on to bull bars.

Geoff Vogt, Chief Executive Officer of the Motor Accident Commission (MAC), which commissioned the research report, said Compulsory Third Party (CTP) claim statistics indicated pedestrians were extremely vulnerable road users, with the Adelaide CBD among areas recording the highest number of incidents.

"Between 2000 and 2005, pedestrians comprised 5.5% of total CTP claims and 11.2% of claim costs. This contributed approximately $42 to the annual CTP premiums of the typical South Australian motor vehicle owner, " Mr Vogt said.

Mr Vogt said while there were no statistics on the number of pedestrian injuries and fatalities involving vehicles fitted with metal bull bars, it was clear that the popularity of four wheel drive vehicles often fitted with bull bars was impacting CTP claim statistics.

"Four wheel drive and other vehicle owners contemplating bull bars should consider pedestrian safety and risk to road users," Mr Vogt said.

The CASR study found that steel bull bars significantly degrade the performance of the front of the vehicle with respect to pedestrian safety.

Steel, aluminium/alloy and polymer bull bars were tested on six popular four wheel drive vehicles. The two metal bars performed much worse in impact tests than the front of the vehicles prior to bull bar fitting.

Polymer bull bars gave much better results and in some cases, slightly improved the safety performance.

Report author, CASR's Dr Robert Anderson, said there were a number of reasons polymer bull bars generally performed better than the metal bull bars in crash tests.

"The polymer bull bars are much lighter and not as stiff as metal bars so in an impact with a pedestrian they tend to give a bit more," Dr Anderson said.

Following an animal strike, polymer bull bars can sustain less damage than metal bull bars. There is also anecdotal evidence that repair costs following an animal strike are less if a bull bar is made from polymer rather than steel. Dr Anderson said he hoped the information would be useful to consumers who wished to consider the safety of a bull bar before deciding whether to fit one on their vehicle.

A report on the CASR bull bar testing, which was conducted in conjunction with the Australian New Car Assessment Program (ANCAP), can be downloaded from the CASR website www.casr.adelaide.edu.au

Media enquiries: Nicole Kerley/Sarah Wise, Corporate Affairs on (08) 8422 8141/ (08) 8422 8131 or Dr Robert Anderson on (08) 8303 5889.

In February 2011, the Hon Catherine King summarily and without reason, terminated he Regulation Impact Statement on Pedestrian Safety before the completion of the public consultation process. This was under the instructions of the then Hon Anthony Albanese, Minister for Transport

It drew scathing criticism from Road Safety Groups across Australia including the AAA, which stated: Backward Step for Pedestrian Safety:

"The premature termination of the consultation period, specifically designed to collect and evaluate a range of views, is an unacceptable subversion of proper process," said AAA's Director Technical Services, Craig Newland. "This was an opportunity to improve the safety of pedestrians that has been dismissed without due consultation. Any concerns or issues identified during the public consultation process should have been dealt with in a considered and transparent manner."

Their Media Releases are attached.

https://www.dropbox.com/s/7yw42yzzar43yz5/Media%20Releases%20-%20Frontal%20Protection%20-%20AAA%20-%20ANCAP%20-%20RACS%20-%20BicycleNSW-%20Feb-Mar%202011.pdf?dl=0

The Australian Design Rule 42.9.1 states:

"No vehicle shall be equipped with any object or fitting, not technically essential which protrudes from any part of the vehicle so that it is likely to increase the risk of bodily injury to any person."

It allows the behaviour depicted in this Today Tonight piece in September 2008 https://www.youtube.com/watch?v=VUWWWLfZDXM&feature=youtu.be

This vehicle was actually being driven on NSW roads until it was defected.

And anywhere north of Noosa, fishing rod holders appear to be compulsory.

Here are some examples:

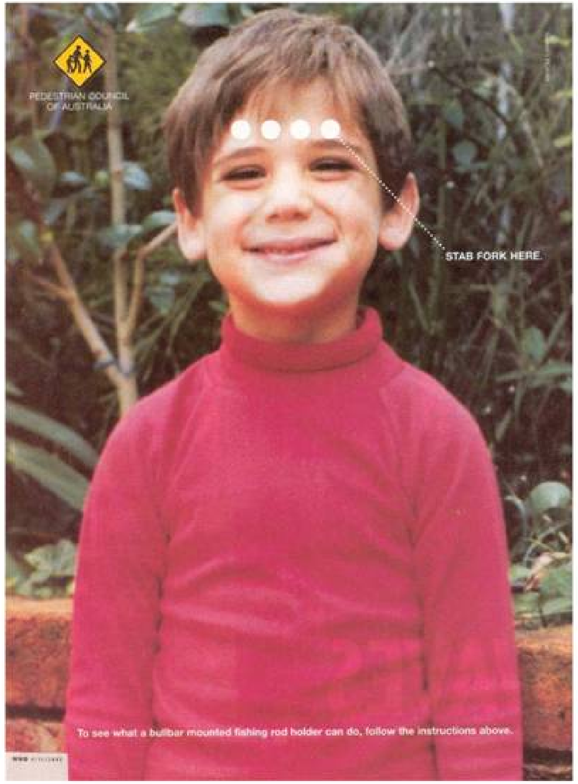

NISSAN

In NSW they are illegal. But not in Queensland.

To a pedestrian or cyclist, it’s like having four butcher’s knives attached to the front of a vehicle.

And there are thousands of these on our roads, three decades after companies like Jaguar and Rolls Royce were forced to remove their mascots because they were killing and seriously injuring so many vulnerable road users.

They caused us to produce this advertisement.



To see what a bullbar mounted fishing rod holder can do, follow the instructions above.

It is a scandal that no commonwealth government since has reinstated this Regulation Impact Statement, let alone that 16 years later we have not adopted the European Frontal Protection standards

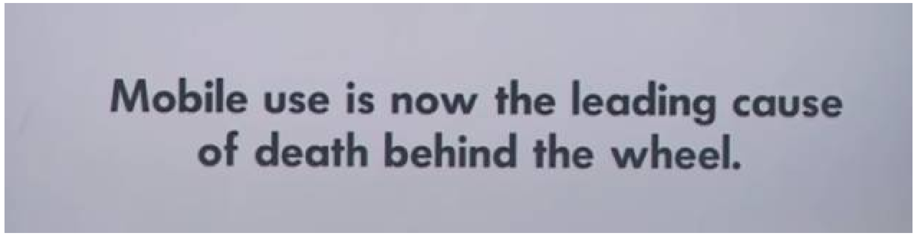
The JCS on Road Safety must recommend that the RIS be reinstated immediately – and that we immediately adopt the European standards

8 - DRIVER DISTRACTIONS

VW made a TV and Social Media commercial a few years ago called Eyes on the Road

https://www.youtube.com/watch?v=R22WNkYKeo8

It concludes:



We also produced a TV Community Service Announcement entitled: DON'T BE A DEAD RINGER:

https://youtu.be/Z9VM7xPV89Q

The PCA has been campaigning for much tougher penalties and enforcement re the use of hand held mobile phones for two decades.

It's encouraging to see the NSW Government introducing high tech camera to catch people who touch their phones while driving.

And many states now have very high penalties and demerit points.

Just to show how much things have changed, see attached a copy of an article re this matter in the Sunday Telegraph of November 2002

https://www.dropbox.com/s/mlq33gen9pg5k7a/Sunday%20Telegraph%20-%20Lethal%20Weapon%20-%20Mobile%20phones%20testing%20-%20020113.pdf?dl=0

We were calling for much tougher $ penalties and Demerit Points.

This was the reply from the manager of Road Safety at the RTA, Mr John Brewer:

> NSW Roads and Traffic Authority road safety manager John Brewer said that although people could die using mobile phones when driving, the offence was not equivalent to that of speeding or drink-driving.
>
> "The number of people who die because they've been using a mobile phone is nowhere near (that of speeding), so our focus has to go on the major issues."
>
> Mr Brewer said the "punishment should fit the offence" and the $118 fine with no demerit points was sufficient penalty.

More compelling evidence as to why Roads authorities should be nowhere near road safety.

But the much overlooked driver-distraction comes from outside the vehicle.

During the last decade, there has been a veritable tsunami of outdoor advertising screens, trailers and Variable Message Signs (VMSs) often placed at traffic lights, pedestrians crossings and roundabouts and intersections.

They have one objective. To direct drivers.

Our presentation to the Royal Australasian College of Surgeons in Nov 2005 is attached entitled FATAL DISTRACTION.

https://www.dropbox.com/s/c2tqvn9bwah4tlg/RACS%20-%20Road%20User%20Distractions%20-%20151118%20-%20For%20NSW%20Planning%20-%20A%20%5BCompatibility%20Mode%5D.pdf?dl=0

It explains most of the issues, problems and possible solutions.

However, with the advent of the giant video screens, these are emerging everywhere and Councils and authorities have been very slow in removing them.

Two years ago the NSW Government introduced Advertising Trailer legislation which has had a great effect in removing this driver distractions from our roads and elsewhere visible to motorists.

9 - PEDESTRIAN DISTRACTION

HOT OFFER $1 A DAY FOR THE FIRST 6 MONTHS 7 DAY HOME DELIVERY + couriermail.com.au access

The Courier Mail

HAPPY GILMORE RIDES WAVE OF SUCCESS

Gold Coast to glory: Super Steph equals record with seventh world title | P70

+ FIND OUT WHO'S NO.1

Exclusive Pedestrians face $200 hit for crossing distracted

WALKING A FINE LINE

THIS MUST STOP

TOM CHAMBERLIN

PEDESTRIANS should be slapped with a $200 fine for not paying attention when crossing the road, a peak advocacy group says.

The Pedestrian Council of Australia wants the penalty introduced along with lower speed limits and changes to traffic light countdowns following the death of 29 Queenslanders crossing roads this year.

The Courier-Mail can also reveal Brisbane City Council will reduce speed limits and introduce senior citizen safety zones in areas where there are a significant number of people over 60.

REPORTS P8-10

The PCA has been very concerned about Pedestrian Distraction for a long time, especially with the introduction of the “not-so smart phone””.

Studies in and recently by the NRMA have revealed that up to one in three pedestrians is using a hand held phone when crossing the road.

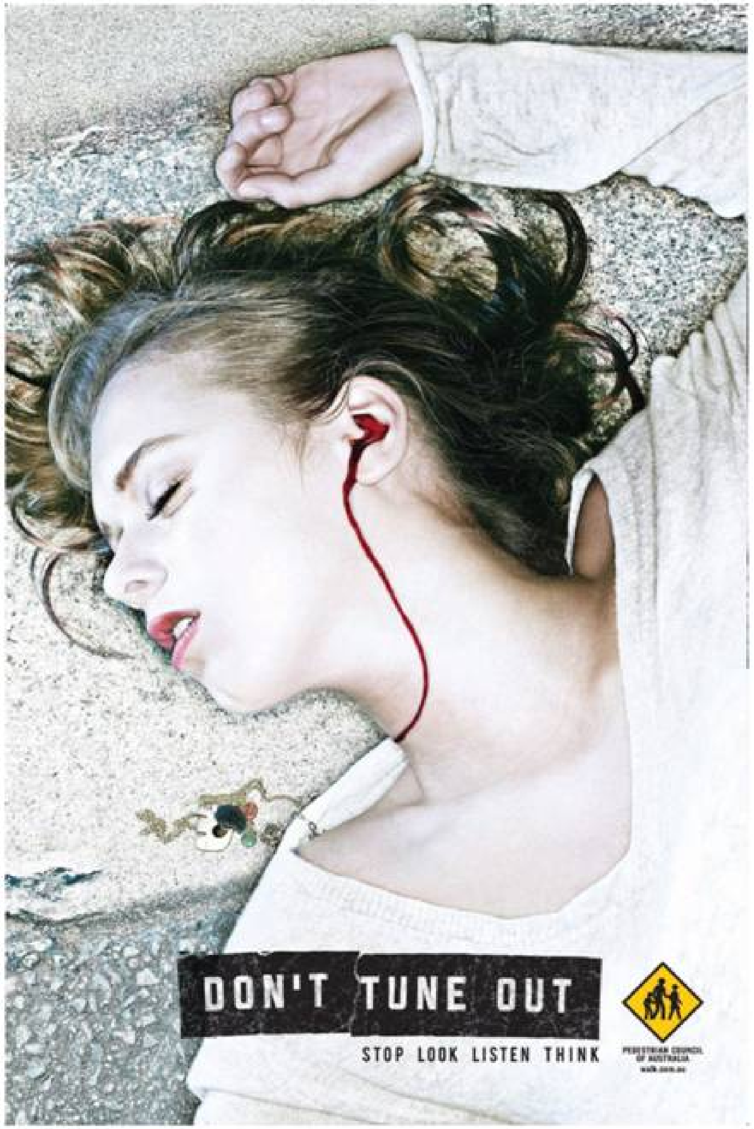
It’s a pandemic.

We have produced several advertising campaigns under the slogan DON’T TUNE OUT:

You can see them here –

https://youtu.be/YG-YWKsnkmM

https://www.walk.com.au/pedestriancouncil/page.asp


DON'T TUNE OUT
STOP LOOK LISTEN THINK

We have also been campaigning for a new national penalty (offence) entitled: CROSS ROAD WHILE DISTRACTED with a penalty of $200

The idea received national attention especially when it hit the front page of the Courier Mail in Nov 2018 (see above)

10 - SHARED ZONES AND SHARED PATHS (and the E-Scooter scourge)

Attached is a copy of our presentation on this vitally important subject to the Royal Australasian College of Surgeons Road Trauma Symposium in Melbourne last November.

It is self-explanatory.

https://www.dropbox.com/s/dicfete9izvrib0/RACS%20Conference%20-%20Shared%20Paths%20and%20E-Rideables%20-%20191113.pdf?dl=0

It demonstrates that about 50% of road users have no idea that in Shared Zones (and Shared Paths) Pedestrians have absolute right of way (because the word Shared has the connotation of EQUAL RIGHTS)

And why would people not be confused when the logo shows a little girl running away from a driverless car (how futuristic of the designer)

It calls on the NTC (with the support of the RTA) to change the name to Pedestrian Priority Zone.

The presentation also shows what few know; that the speed limit on a Shared Path is the same as the adjacent road. Here's an example of one of the most used Shared Paths in Sydney (from the Harbour Bridge dedicated path) where children walking to the Fort Street School have to walk on a footpath where the legal speed limit for cyclists is 70 km/h.

In 2013, the then Roads Minister Duncan Gay mistakenly tried to pass the problem to the then Transport Minister Berejiklian.

Watch the video from September 2013 and realise nothing has changed ...

https://www.youtube.com/watch?v=oltvTip-TLY

To date ... nothing

In NSW the only place where there's a defined and enforceable speed limit of 10 km/h on a Shared Path is on the Pyrmont Bridge.

It does not meet any of the Austraods Guidelines, yet is one of the busiest pedestrian thoroughfares in Sydney

The attached article in the Telegraph of October 2014 revealed:

https://www.dropbox.com/s/9mmyvwnq0jnm4xk/Telegraph%20Arrogant%20Rude%20Dangerous%20-%20Cyclists%20Pyrmont%20Bridge%20Shared%20Path%20141018.pdf?dl=0

The SHFA audit was taken during the morning and afternoon peak over five days, with the lowest average speed over the period at 23km/h and the highest average speed 27km/h.

Civil liability barrister James Sheller said pedestrians who are injured by cyclists would find it difficult to claim for physical damage because there is no compulsory insurance scheme for cyclists.

To date, it is believed that not one cyclist has been booked for speeding on the Pyrmont Bridge

A veritable protected species.

But proof there is a screaming need for a full review of Shared Paths.

In their letter to all Victorian MPs in October VicWalks, COTA and Vision Australia (see attached)

https://www.dropbox.com/s/8j1gn5k294dw5ss/VicWalks%20-%20COTA%20-%20Vision%20Aust%20-%20E-scooters%20-%20Footpath%20Cycling%20Letter%20Oct%202018.pdf?dl=0

Victoria walks   COTA For older Australians   Vision Australia Blindness. Low Vision. Opportunity.

2 October 2018

Dear

Threats to the mobility of the most vulnerable Victorians

We are writing to all Victorian MPs because our footpaths are facing unprecedented demands that threaten the mobility of the most vulnerable Victorians.

We are seeking your assurance that you will not support a change in road rules to allow teenagers and/or adults to cycle on footpaths in Victoria or to allow electric scooters to travel at speeds greater than 10 km/h.

In late 2018, the Qld Government in concert with the Brisbane City Council introduced E-Scooter company Lime to the footpaths of Brisbane.

The rules and regulations if you can call them such, are the most disgraceful we have observed throughout the world.

They are an utter disgrace.

They allow a person to rent a Segway weighing up to 65 kgs to ride on any footpath in Brisbane up to a speed of 25 km/h.

If that person feels so inclined, he/she can rent another Segway for a child ages 12 or over to accompany him or her.

In their submission to the NTC, Vision Australia stated:

https://www.dropbox.com/s/pekwm8bdsxihguc/NTC%20Vision%20Australia%20Submission.pdf?dl=0

Our Views

While we support innovation and recognise that electric scooters can be a convenient way of travelling short distances in CBD areas, it is our strong view that there is no justification whatsoever for allowing any rideable vehicle such as an electric scooter to travel at speeds greater than 10 km/h on footpaths that are available for use by pedestrians. The raising of this speed limit to 25 km/h, as has been done in Queensland, is in our view completely irresponsible and shows a wanton disregard for pedestrian safety, especially pedestrians who are blind or have low vision.

In 2008, following an incident where a woman was permanently brain damaged by a cyclist on a Shared Path (in 2002), Slater and Gordon provided us with the following advice regarding Shared Paths:

https://www.walk.com.au/pedestriancouncil/page.asp?PageID=3125&SiteID=1

I am therefore of the opinion that local government road authorities may be found to be in breach of duty of care for failing to impose safe speed limits for bicyclists on Shared Bicycle Paths although any such finding of breach of duty of care must necessarily depend upon the particular facts of the case before the Court. Allegations of breach of duty of care based upon the design or configuration of Shared Bicycle Paths may also be successful even though those paths apparently conform to existing design guidelines in circumstances where they offend general transport engineering principles in relation to acceptable sign distances for users and other engineering requirements.

Few if any Shared Paths in Australia comply with the requirements in the Austraods Guidelines

Attached is a copy of our presentation to the Royal Australasian College of Surgeons Road Trauma Committee Symposium in November 2019.

https://www.dropbox.com/s/dicfete9izvrib0/RACS%20Conference%20-%20Shared%20Paths%20and%20E-Rideables%20-%20191113.pdf?dl=0

It will explain in details the serious issues in allowing any vehicle on a footpath and the long term consequences should we not take action now.

We are awaiting formal approval to release the Recommendations of the NSW E-Scooter Advisory Committee.

> **Transport for NSW**
>
> # ESA Working Group – Electric Scooter Trial Recommendations Report
>
> DRAFT
>
> *February 2020*

However, NSW Minister for Transport, the Hon Andrew Constance announced late last year (quote): **"Ultimately they're not going to form any part of the transport solution in our city. They're a danger to the community, they're a danger on the roads, they're dangerous on footpaths, and they're dangerous generally," he claimed. "It's unacceptable and we're not going to bring that here." "Ultimately they're not going to form any part of the transport solution in our city. They're a danger to the community, they're a danger on the roads, they're dangerous on footpaths, and they're dangerous generally," he claimed. "It's unacceptable and we're not going to bring that here."**

https://www.dropbox.com/s/btab8g8z7ycn5wu/Channel%2010%20-%20Sydney%20E-Scooter%20Trial%20Axed%20-%20101128.pdf?dl=0

11 - 30KM/H ZONES – PEDESTRIAN CROSSINGS AT ROUNDABOUTS – COUNTDOWN TIMERS ON THE WAIT PHASE – SCRAMBLE CROSSINGS - 10 KM/H SHARED ZONES FOR ALL PUBLIC AND PRIVATE CARPARKS

Attached is a copy of the presentation to the Royal Australasian College of Surgeons Road Safety Symposium in November 2019 regarding the above subjects. It is self-explanatory.

https://www.dropbox.com/s/37f5bslzkejz9m5/RACS%20-%2030%20kmh%20-%20Roundabouts%20-%20Timers%20-%20Scramble%20Crossings%20-%20Carparks%20-%20191113A.pdf?dl=0

30 km/h Zones in Area of High Pedestrian Activity

In brief we have been advocating 30 km/h Zones in all areas of high pedestrian activity for many years now.

How fortunate that the it was just announced in the SMH on Friday 21 February 2020 (quote):

Push to cut speed limit to 30km/h in 130 nations

Stockholm: About 130 nations have backed calls to mandate maximum speeds of 30km/h in areas where vulnerable road users and vehicles frequently mix, except where '' strong evidence' ' shows higher speeds are safe.

Recommendations in the Stockholm Declaration, endorsed in Sweden on Wednesday, also addressed the need to mitigate the impact of speed to reduce fatalities and injuries, improve air quality and address climate change.

This recommendation has the greatest potential of all interventions in reducing deaths and injuries for vulnerable road users. (see presentation attached):

https://www.dropbox.com/s/37f5bslzkejz9m5/RACS%20-%2030%20kmh%20-%20Roundabouts%20-%20Timers%20-%20Scramble%20Crossings%20-%20Carparks%20-%20191113A.pdf?dl=0

Pedestrian Crossings at Roundabouts

While roundabouts have had a great effect in reducing road trauma for motorists, they have increased the potential for harm for pedestrians.

In most western European cities in areas of high pedestrian activity, it is common to see roundabouts at most intersections. (see presentation attached)

https://www.dropbox.com/s/37f5bslzkejz9m5/RACS%20-%2030%20kmh%20-%20Roundabouts%20-%20Timers%20-%20Scramble%20Crossings%20-%20Carparks%20-%20191113A.pdf?dl=0

Addition: Northern Beaches Council has just introduced a 30 km/h Zone in Manly and intends to do more:
https://www.dropbox.com/s/i7bwrdtpab7dj7o/SMH%20-%2030%20kmh%20Zones%20-%20State%27s%20Slowest%20Streets%20-%20200711.pdf?dl=0

Countdown Timers on the Wait Phase

While governments throughout the world are increasingly introducing countdown timers on the crossing phase, countdown timers on the wait phase are increasingly common in Scandinavia.

They provide pedestrians with information as to how long they have to wait, lessening the likelihood that they will cross against the lights.

They also keep roads authorities honest because in many cities, traffic lights are controlled by motor vehicles passing over magnetic strips in the road.

Yet pedestrians are by far the greatest road user in CBDs, so it is utterly absurd that their ability to cross the road without long waits and short crossing times, should be dictated by motorists. (see presentation):

https://www.dropbox.com/s/37f5bslzkejz9m5/RACS%20-%2030%20kmh%20-%20Roundabouts%20-%20Timers%20-%20Scramble%20Crossings%20-%20Carparks%20-%20191113A.pdf?dl=0

Scramble Crossings

Scramble (or diagonal) crossings improve the safety of pedestrians because they only need to be on the road for half the time.

It also means they don't have to wait twice to cross the road diagonally.

They are widely in use in cities like Los Angeles and should be considered for every intersection in CBDs in Australia (see presentation attached)

https://www.dropbox.com/s/37f5bslzkejz9m5/RACS%20-%2030%20kmh%20-%20Roundabouts%20-%20Timers%20-%20Scramble%20Crossings%20-%20Carparks%20-%20191113A.pdf?dl=0

10 km/h Shared Zones for ALL Council and Commercial Carparks

Many people are unaware that unless otherwise sign-posted, the speed limit is the same as the adjacent road. Additionally, it is likely that the motorist has the right of way because it is a road-related area.

We are advocating that ALL carparks, public and commercial be 10 km/h Shared Zones, thus defining a safe speed limit and transferring the responsibility to the motorist, and giving pedestrians absolute right-of-way,

The PCA was recently successful in lobbying the Northern Beaches Council which has already begun transforming all its carparks into 10 km/h Shared Zones.

Companies like Bunning’s and Westfield have also commenced proclaiming their carparks 10 km/h Shared Zones (see presentation attached)

https://www.dropbox.com/s/wa0gh44z915ii25/Carparks%20-%20Generic%20-%20181213%20-%20red%20%282%29.pdf?dl=0

12 - WORK ZONES

Work Zones throughout Australia seem to be rarely enforced. While many display 40 km/h Speed Limit signs with other signs stating “Roadwork Speed Limits Enforced in Victoria:

It’s not unusual to see traffic moving through these zones at high speeds, often double the posted limit. But work zones often contain many pedestrians and so it’s very dangerous when motorists ignore these zones.

It is understood that police across Australia may find it difficult to book motorists in these zones because they effectively need to be “gazetted”.

Much more work needs to be done to protect workers in these zones, including the use of Point-to-Point (Average) speed cameras as in the UK and 30 km/h Work Zone Speed limits as in NZ and other countries.

In the US, there are double penalties for speeding in Workzones.

(Please excuse the poor image quality)

13 - PARKING ENFORECEMENT

Dangerous Parking can have the same lethal consequences as dangerous driving:

THE DAILY TELEGRAPH - Saturday 14 April 2007

Tears for young life lost

Farewelling boy run over by garbage truck

By EVELYN YAMINE

FIVE-year-old Connor Mark Greasby had a passion for Aussie Rules, cricket and riding his bike.

Yesterday, his family and friends said a final farewell to the "perfect little man", who died when he was knocked over by a reversing garbage truck while riding his pushbike on Good Friday.

Exactly one week after his tragic death near his family home in Kellyville Ridge, Connor's short life was celebrated during a funeral service at the Blessed John XXIII Catholic Church yesterday.

His distraught father Jason Greasby gave the only eulogy at the service on behalf of his wife Leisa and their three-year-old daughter Olivia.

Mr Greasby told the hundreds of mourners his son loved sport, had doted on his sister Olivia, was full of life and fearless.

He said Connor loved playing cricket and football in the backyard and always made everyone laugh.

Mr Greasby spoke of how proud he was of Connor, who had just started kindergarten this year and was playing Aussie Rules for a local club.

"We'll never forget you, Connor. We'll always love you," Mr Greasby said, as he tried to hold back tears.

A prayer of the faithful read in church described Connor as "cheeky" and "playful".

"Dear Lord, we give thanks for Connor, for his cheeky, playful personality and kind nature. He brought love and laughter to all that he touched," it read.

Symbols of Connor's life — his cricket bat, football and AFL jerseys for his favourite teams — Collingwood and the Sydney Swans — were placed on his white coffin.

A collage of photographs of Connor's life was shown to mourners, many who were weeping, especially when the song *Forever Young* by Youth Group was played.

His coffin was carried out of the church to the sounds of the Sydney Swans and Collingwood club songs.

Students from Connor's school, John XXIII Catholic primary school, and two other local Catholic schools formed a guard of honour.

❑ No charges will be laid against the garbage truck driver.

Quakers Hill Police Inspector Stephen Wye told *The Saturday Daily Telegraph* the truck driver was not at fault for the "tragic" accident at Stave Place, Kellyville Ridge.

"It was an act of God, a freak accident," Insp Wye said.

"The driver reversed to get to a garbage bin he couldn't get to because cars were parked half on the footpath and as a result the boy was fatally injured."

The driver — who is receiving counselling — had checked his mirrors and the truck's reverse warning sounds were working.

'Perfect little man' . . . Connor Greasby's young friends (above) cry at his funeral yesterday and (left) Connor and (right) his parents Jason and Leisa and sister Olivia.
Pictures: TROY BENDEICH

Daily Telegraph – 14 April 2007

(QUOTE): "Quakers Hill Inspector Stephen Wye said: 'The driver reversed to get to a garbage bin he couldn't get to <u>because cars were half parked on the footpath</u> and as a result the boy was fatally injured."

INQUIRY INTO THE NATIONAL ROAD SAFETY STRATEGY 2011-2020
SEPTEMBER 2018

> "Local governments are responsible for managing around 82% of the road network in Australia where 52% of all casualty crashes and 40% of all road deaths occur. This means that driving on a local road involves an increased risk of being seriously injured that is 1.5 times higher than driving on a state road".54

While they are accountable for managing around 82% of the road the networks, and in spite of these alarming statistics, Councils throughout Australia do not contribute one cent to the $30 billion per annum costs of road trauma.

As such, many of their focus and management decisions and mostly based on commerce before safety.

The attached case studies are good examples.

(a): Berry Street NORTH SYDNEY 2060 (Parking Meters – Pedestrian Crossing – Line of Sight):

https://www.dropbox.com/s/y2idjvq5sqt6fdu/CaseStudy1_NorthSydneyCouncil_Berry_Yeo_West.pdf?dl=0

(b): Military Road MOSMAN 2088 (Safety Fences outside Mosman Hotel – The Killing Fields):

https://www.dropbox.com/s/uedmztenctz2i07/Case%20Study%202%20-%20Mosman%20Hotel%20-%20The%20Killing%20Fields.pdf?dl=0

Attached is an Opinion piece I wrote in the Telegraph in March 2011 entitled "A Meter Maid Mentality" which is a précis of the issues (quote):

https://www.dropbox.com/s/ohf1unatuqgkqs2/Telegraph%20Opinion%20Meter%20Maid%20Mentality%20110320A.pdf?dl=0

> When faced with the option of compromising safety and line of sight or installing an extra parking meter, councils will usually opt for the dollar. They are not required to perform any safety or needs assessments. There is little if any consideration given to the delivery agents or transport operators. So they have developed a universal system which would make Stevie Wonder blush.
>
> Because there are not enough spaces to park legally, rangers are pressured to turn their collective blind eyes to all things commercial such as trucks, couriers, taxis and tradesmen.
>
> While they can spot an expired meter from Mars, rangers won't see a semi-trailer parked across a pedestrian crossing, especially if its hazard lights are flashing, or there's at least one orange witch's hat within cooee. They are also pressured to lay off residential areas and avoid rate-payers and voters – it's an unwritten, ubiquitous policy of strategic avoidance: "No complaints, no confrontation, no media. Just blitz the meters."

Also attached is a presentation to the NSW Audit Office in October 2019 which explains the issues in detail, especially the need for WorkCover agencies to start treating commercial driving, especially large trucks around work-sites, as temporary work sites.

https://www.dropbox.com/s/jg1der5vj93dm94/NSW%20Audit%20Office%20%20-%20Public%20Safety%20-%20Parking%20Enforcement%20-%20191009A.pdf?dl=0

These people are as much at work and subject to the same dangers (or create dangers for others) as those on the work sites.

And if they weren't "at work", why are they required to wear fluoros?

The attached article in the SMH of January 2007, "Truck driver widower won't give up" highlights the issues (quote):

https://www.dropbox.com/s/sqrlqioov1gvq37/SMH%20-%20Truck%20death%20-widower%20who%20won%27t%20give%20up%20-%20070127.pdf?dl=0

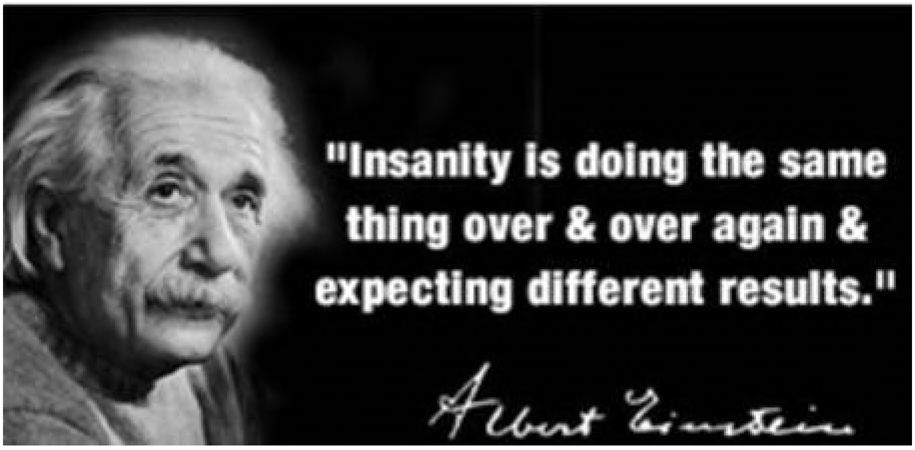
> Alan Welch's remarkable struggle began the day he read that letter. His wife had been dead only 10 weeks. He was raw and angry. He now knew about the problem of trucks at Gleneagles. Boiled down to its essentials, the long campaign Welch was about to embark on was designed to focus the attention of authorities on the problem of those trucks. They queued out on the median strip; they blocked driveways; and they swung dangerously across the traffic to enter the site's oddly angled driveway. One of them had killed his wife.

Council Traffic Committees and Parking Enforcement across Australia are screaming out for independent review.

And WorkCover agencies across Australia must be required to ensure (regulate) that the behaviour of ALL commercial drivers, especially large trucks, when they are at work, are treated in exactly the same way as if they were on a work-site.

[redacted]

From: Pedestrian Council <pedestrian.council@gmail.com>
Sent: Wednesday, 24 March 2021 12:17 AM
To: ONEILL Gabby; Minister McCormack; Scott.Buchholz.MP@aph.gov.au; michael.mccormack.MP@infrsatructure.gov.au
Cc: [redacted]
Subject: RE: Response to the DRAFT 2021 to 2030 NRSS – Part 3 - Pedestrian Safety and Ticking Boxes
Attachments: Victoria Walks - Understanding-Pedestrian-Crashes.pdf; Shared Paths - injuries - de Rome Pedal Transport TIP 2013 (2).pdf; SMH - Opinion - Towards nothing - the sorry fate of a road safety summit - 200528A.pdf



The Hon Michael McCormack and the Hon Scott Buchholz
Parliament House
CANBERRA

Attention: Ms Gabby O'Neill

Dear Ministers

Response to the DRAFT 2021 to 2030 NRSSP – (Part 3)
Pedestrian Safety and Ticking Boxes

Everyone who has been in Road Safety as long as we have knows how the system works in Road Safety.

Politicians rarely discuss it because they can't see any votes in it and think they will lose votes if they actually do something, especially if they advocate "enforcing" (E for Enforcement) the laws which they make.

So they rely on the other two E's – Engineering and Education.

They love announcing lots of new roads, especially in rural areas and marginal seats – and lots of education in the form of advertising campaigns like Towards Zero. (see my attached Opinion Piece entitled Towards Nothing)

By the way, we prefer your Vision Zero 2050 (as opposed to the NSW and Victoria Towards Zero) because it has a date and actually states when we get there – you mention it six times in your glossy

And they love lots of summits and rectangular roundtables

And promulgating pamphlets and creating glossy brochures of plans which will never eventuate and are so far off that few if any will be around to be held accountable.

That's why we are extremely suspicious of this DRAFT NRSS which we believe is already set in concrete but all the "key stakeholders" are being used to show that everyone was consulted.

It's called TICK-A-BOX

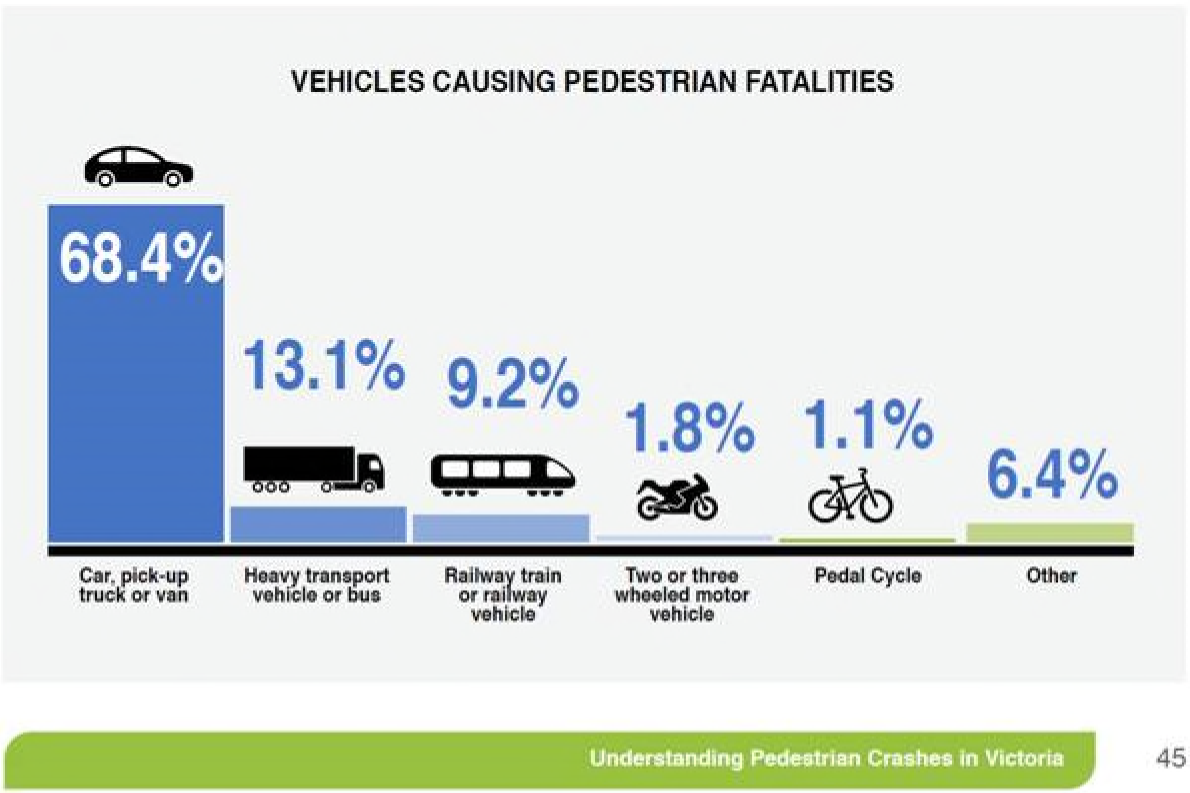
We really hope we are wrong, but we have seen this so many times that we have become a smidgen cynical.

In any event, to add to our previous Submissions, we would like to finish by showing you a couple of documents to prove that you must separate Pedestrians, Cyclists and Motorcyclists and stop lumping us all together under the banner of Vulnerable Road Users.

We are all Vulnerable Road Users but that's where it stops.

Attached is an excellent report by Victoria Walks entitled Understanding Pedestrian Crashes

One of the most interesting graphs is this one:



It shows that in Victoria, 2.9% of the vehicles which caused pedestrian deaths were by motor-cyclists and cyclists.

You can extrapolate that they caused between 10 and 15 times that number of serious injuries.

Yet you have lumped us all together.

Liz De Rome's study "Bicycle Crashes in Different Riding Environments in the Australian Capital Territory" found:

Perhaps the most important finding is the relatively high crash involvement rate on shared paths compared to cycle lanes. These findings are consistent with other studies that have concluded that separated cycle-only facilities such as on-road cycle lanes have a positive safety effect (Moritz 1998; Reynolds et al. 2009), whereas shared facilities such as footpaths (sidewalks) and shared paths (multiuse trails) have been found to pose higher injury risk than riding in traffic (Aultman-Hall and Hall 1998; Aultman-Hall and LaMondia 2005; Moritz 1998; Reynolds et al. 2009).

The findings for shared paths raise questions that need to be resolved urgently as public policy increasingly promotes their usage (Austroads 2010). Though over half of those injured on shared paths were in single bicycle-only crashes, almost one quarter involved other cyclists and 20 percent involved a pedestrian. Crashes on shared paths and in traffic were also more likely to result in serious injury and to require admission to hospital than those on cycle lanes or footpaths. Though the injury risk of collisions with motor vehicles is undeniable, these findings indicate that undue focus on motor vehicles may lead cyclists to underestimate other sources of injury risk, particularly other cyclists.

The relatively high speeds self-reported on shared paths and footpaths indicate a need for speed zonings and management to be reviewed. Australian guidelines recommend that bike paths be designed for speeds of 30 km/h or more but that speeds on footpaths should not exceed 15 km/h (Austroads 2009). Many of the cyclists who crashed on shared paths referred to them as bike paths, which may reflect longstanding usage. The legal status of these paths in relation to traffic regulation requires clarification to ensure that they are under appropriate jurisdiction for traffic management, enforcement, and crash reporting requirements.

There has been relatively little research into bicycle–pedestrian crashes, but there is evidence that the injury kinematics may be quite different from those in motor vehicle–pedestrian impacts. Whereas it is the primary impact with the motor vehicle that causes the most severe injuries to a pedestrian, in bicycle–pedestrian impacts the most serious injuries are from secondary impacts to the pedestrian's head with the ground (Sikic et al. 2009). Researchers modeling bicycle–pedestrian impacts have found that the risk of head injury to a pedestrian occurs at impacts from 10 km/h with little evidence of risks increasing as bicycle speeds increase (Short et al. 2007). A recent study of hospital data in New South Wales concluded that though fatal injuries from bicycle–pedestrian collisions are fewer than from motor vehicle–cyclist collisions, the risk of serious injuries is similar (Chong et al. 2010).

Both studies found that cyclists- pedestrian crashes were grossly under-reported and in Victoria, over 16% of cyclists left the scene of the crash after hitting a pedestrian.

We are a rapidly ageing population where the highest cause of avoidable death after 50 is from a fall.

With the advent of every imaginable e-rideable, we desperately need infrastructure, laws and vigorous enforcement to preserve the safety, sovereignty and amenity of our footpaths and crossings.

We have dramatically different needs and wants to cyclists and motor-cyclists.

SO PLEASE DON'T LUMP US ALL TOGETHER.

PLEASE CONSIDER THE UK HIERRACHY SYTEM.

PUT PEDESTRIANS FIRST!

Pedestrian safety needs to catch up to technology and put people before cars

What do we recommend?

The UK Manual for Streets presents a street user hierarchy that puts pedestrians at th
That is, their needs and safety should be considered first.

Consider first	Pedestrians
↓	Cyclists
	Public transport users
	Specialist service vehicles (e.g. emergency services, waste, etc.)
Consider last	Other motor traffic

A recommended hierarchy of street users.
Manual for Streets/UK Department for Transport

PS: At least there's one positive point in your glossy: You haven't used the word "accident" once.

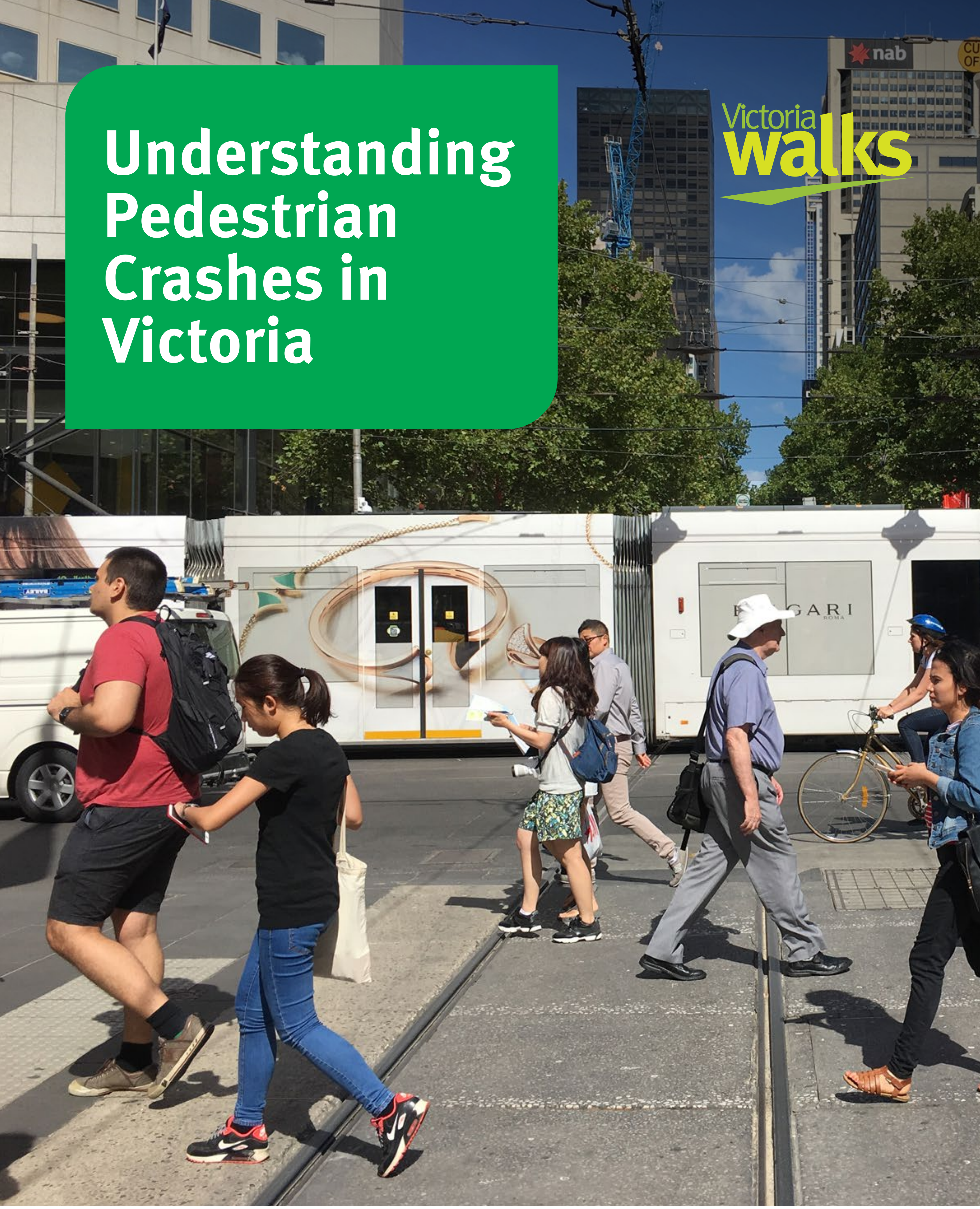
Regards

Harold Scruby
Chairman/CEO

Pedestrian Council of Australia Limited
The Walking Class
Registered Charity (ACNC) No: 18075106286
Telephone: (02) 9968-4555 - Mobile: [redacted]
Email: mail@walk.com.au - Internet: www.walk.com.au
PO Box 500 - NEUTRAL BAY NSW 2089 – AUSTRALIA - ABN 18 075 106 286

Understanding Pedestrian Crashes in Victoria

Victoria walks



MONASH University
Accident Research Centre

This report was prepared by Associate Professor Jennie Oxley, Dr Steve O'Hern and Dr Karen Stephan of the Monash University Accident Research Centre, with input from Duane Burtt and Dr Ben Rossiter of Victoria Walks, June 2020.

Victoria Walks Inc is a walking health promotion charity working to get more Victorians walking more every day. Our vision is people walk whenever and wherever possible, within strong and vibrant communities, with resulting health benefits. Victoria Walks is supported by VicHealth.

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Oxley J, O'Hern S, Stephan K, Burtt D and Rossiter B, *Understanding Pedestrian Crashes in Victoria*, Victoria Walks, Melbourne, July 2020.

Table of Contents

Executive Summary

This report seeks to provide the clearest possible picture of pedestrian crashes in Victoria given the available information and statistics.

With the support of a Transport Accident Commission (TAC) Community Road Safety Grant, Victoria Walks commissioned the Monash University Accident Research Centre to undertake the study, reviewing the relevant literature and analysing Victorian police, TAC, hospital and cause of death data.

Literature Review

Vehicle speed is a key risk factor for pedestrian injury and death. The higher the speed of a vehicle, the less time a driver has to stop and the higher the impact speed if they don't. The probability and severity of injury increases exponentially with vehicle speed. It is estimated that, for every 1 km/h increase in average vehicle speed, the number of injury crashes will rise by around three percent.

In Victoria the default urban speed limit was reduced from 60 km/h to 50 km/h in 2001. It has been estimated that fatal and serious injury crashes involving pedestrians were reduced by 25 to 40 percent as a result.

Older adults are over-represented in pedestrian fatalities and have an increased risk of severe injury. They are more likely to sustain fractures in a crash, and they have a high recovery time and likelihood of long-term disability. The effects of ageing on sensory, visual, perceptual and cognitive abilities may also increase risk on the road. However, it is important to recognise that older pedestrians are generally safe and cautious in their travel behaviour.

In terms of pedestrian behaviour increasing the likelihood of crashes, injury and death, the clear risk factor is intoxication. The proportion of pedestrian deaths involving intoxicated pedestrians (BAC over 0.5) in Australia has been previously estimated in the range of 30-45 percent. Pedestrians killed or seriously injured while intoxicated are more likely to be male and in younger age groups.

A number of studies suggest that a minority of pedestrians may possibly be distracted by mobile phones when crossing the street. However, no significant relationship with actual crashes seems to have been identified.

Drivers also contribute to increased pedestrian risk and the main factors include a lack of understanding the impacts of driving at high/inappropriate speeds in environments where there is a mix of vehicles and vulnerable road users, poor/inappropriate travel speed choice and non-compliance with speed limits, driving while distracted, and generally poor attitudes to pedestrian safety.

Vehicle design is a significant factor in the likelihood and consequences of a crash. SUVs have a greater risk of collision with pedestrians because the vehicle mass in front of the driver may obscure their vision of people walking, particularly children. In addition, pedestrians struck by an SUV or four-wheel-drive vehicle are more likely to incur serious head, thoracic, abdominal and spinal injuries. The typical trajectory for a person being hit by SUV or light truck involves being hit above their centre of gravity, so that being run-over by the vehicle is more likely.

Elements of streetscape design that separate pedestrians from motor vehicles on roads with speeds above 30 km/h (notably footpaths) and those that enable pedestrians to cross roads safely and arterial roads in particular, are also important mechanisms to ensure safety.

Executive Summary

Police and TAC Data

Data was extracted from the Victoria Police Accident Records System (VPARS) linked to the TAC claims dataset, for pedestrian crashes between 2009 and 2018 and compared against hospitalised data. It should be noted that not all crashes involving injury to pedestrians require hospitalisation and/or police attendance; so there are some differences between data collected in each data set. In addition, not all pedestrian injuries occurring on a road or roadside involve vehicles and as such are not included in VPARS or TAC data. Furthermore, there is only limited information in the data regarding the circumstances that may have contributed to the collision. This reflects the limitations of the codes used to classify pedestrian crashes.

Across the period, cars were involved in 17.9 pedestrian crashes for every 100,000 registered vehicles in Victoria. By comparison, the crash rates for taxis (728.3), panel vans (204.5) motor scooter or moped (154.7) and buses (99.0) were all much higher.

Police reported the driver involved in the crash as offending in 46.4 percent of collisions, while 35.5 percent were not considered as offending and for 18.1 percent this was not known or reported. A concerning finding was that 15 percent of all pedestrian crashes were coded as Hit/Run.

Analysis of vehicle movement indicates that the highest proportion of collisions involved a vehicle travelling straight ahead (43.5%), followed by right (15.7%) and left turning (8.5%) vehicle movements and reversing (6.7%).

There was a similar proportion of collisions at, and away from, intersections. The majority of pedestrian crashes were found to occur on roads with posted speed limits of 60 km/h (31.0%) or 50 km/h (29.8%). Fatal and serious injuries were more likely on roads with higher speed limits.

The majority of crashes were reported within the Metropolitan Melbourne area (81.5%), however rural and regional Victoria were over-represented when considering population statistics.

The highest concentration of crashes occurred in the Melbourne CBD, from Southbank to Carlton, reflecting high pedestrian activity. Other sizeable clusters included St Kilda, Prahran, Footscray, Preston, Dandenong, Frankston, Geelong and Werribee. There were also less prominent clusters at many major intersections, particularly along major arterial corridors, and in the vicinity of railway stations.

The highest proportion of pedestrian crashes occurred in the afternoon, between 2:00pm and 3:59pm (14.4%) and 4:00pm to 5:59pm (14.3%), with a more defined morning peak between 8:00am and 9:59am (12.0 %). Young people (16-39), especially males, were over-represented in collisions that occurred at night, most notably between 10:00pm and 6:00 am. Previous research has identified these as high alcohol times.

When considering the month of the year, crash rates were higher in the winter months. While this may indicate an increased risk for pedestrians when it is dark or wet, across the year the majority of pedestrian collisions occurred in clear weather conditions (82.4%, compared to rain 9.3%) and during daylight hours (63.6%). The proportion of crashes occurring when it was dark was 27.6 percent (mostly where street lights were on) and 6.8 percent of crashes occurred at dusk or dawn.

Hospital Data

Separate datasets were analysed for both hospital admissions and Emergency Department (ED) presentations, for all pedestrian cases between 2008 and 2017, which was the most current data available.

There were at least 10,845 hospital admissions and 11,590 emergency department presentations involving an injured pedestrian during this period – averaging more than 2,200 per annum.

When considering the types of injuries sustained, the most commonly injured body region was the head, followed by injuries to the knee, lower leg and foot. Across the two datasets, fractures were the most common type of injury, representing 21.3 percent of cases to the ED and 44.5 percent of hospital admissions.

Half of hospital admissions were less than 2 days in duration, but 32.5% were for 2-7 days, 14.8% were stays of 8-30 days and 1.9% of hospitalisations extended for more than a month.

Executive Summary

General Findings

In addition to analysis of the datasets above, pedestrian deaths in Victoria between 2008 and 2017 were extracted from the National Cause of Death Unit Record File. This recorded an average of 56.4 fatal pedestrian injuries recorded per annum in Victoria. The majority of pedestrians were killed due to being hit by a car (68.4%), followed by heavy transport vehicles or buses (13.1%) and trains (9.2%).

In terms of trends, the number of crashes involving a pedestrian that were reported to police decreased by 3.3 percent per annum, from 1,740 reported crashes in 2009 to 1,320 reported crashes in 2018. However, the decrease occurred mainly in the first half of the study period and the level of reported crashes remained reasonably constant over the final 5 years. The hospital data, which captures a higher proportion of pedestrian crashes, shows a slightly different picture. The emergency department presentations only decreased by 1.54%, and there was no real change in the rate of hospital admissions. The general trend in fatalities is downward, but with considerable variation between years.

When considering Victoria's rapidly increasing population, the relative risk to pedestrians when walking is decreasing. Time trend analysis suggests that the risk of pedestrian injury at a population level is reducing across gender and age groups, although the lowest rates of reduction were observed for older pedestrians, when considering population as an exposure measure.

It should be noted that the detailed datasets analysed in this report do not encompass the increase in pedestrian fatalities in 2019.

In general, males were found to have a higher risk of injury compared with females, although in some instances the differences were not statistically significant. The notable over-representation is in fatalities, where men are almost twice as likely to be killed as pedestrians compared to women.

When considering age groups, compared to pedestrians aged between 16 and 39 years, children (0 to 15yrs) had roughly half the risk of crash involvement when controlling for population. Adults aged 40 to 59 years had lower relative risks of injury.

Pedestrians aged 70 years and older have the greatest risk of injury, roughly 1.6 times higher than young adults (16 to 39 years). In police data adults aged 70 years and older were 15 percent of all injury cases, while only 10.7 percent of the Victorian population.

Executive Summary

Recommendations

The following recommendations are made to reduce on-road pedestrian deaths and serious injuries.

Safer speeds and safer roads

Recommendations include:

- Reductions in speed limits, including to 30 km/h in areas of high pedestrian activity and residential streets;
- Speed limit reductions are supported with appropriate traffic calming infrastructure to ensure drivers and riders are compliant with speed limits;
- Provision of more pedestrian oriented developments (pedestrian prioritisation);
- Implementation of Safe System aligned treatments to separate vulnerable road users and vehicles and create safer crossing points;
- Implementation of Safe System aligned treatments to improve sight distance and visibility of pedestrians;
- Provision of safe, convenient and direct walking routes to minimise the need for risky walking behaviours; and
- An ongoing program of state government investment to deliver these improvements.

Safer vehicles

Recommendations include:

- Development of programs and initiatives to address improved uptake and awareness of safer vehicles (e.g., targeted education campaign on safe vehicle purchase and use; providing financial or other incentives for purchasing safer vehicles);
- Enhance and further promote existing information and resources such as www.howsafeisyourcar.com.au, www.ancap.com.au, used car safety rating guides; and
- Further development of technologies to assist with detection of pedestrians and crash avoidance.

Safer road users

Recommendations include:

- For drivers, develop educational and training programs addressing pedestrian safety and adoption of safer driving practices and enforcement of lawful driving;
- Support national efforts to promote walking and walkable communities through health promotion campaigns;
- For older pedestrians, development and implementation of education and behavioural programs providing information on schemes and initiatives to support and promote active travel, technologies and other media to provide active travel information;
- For children, development and implementation of educational and training programs promoting safe active travel co-ordination with schools, parents and councils to provide safety around school environments; and
- For young adults, development of programs addressing alcohol and drug use and walking, alongside measures to manage the road environment around alcohol venues.

Introduction

Walking is the most fundamental mode of transportation. In essence all road users are pedestrians, with walking forming part of almost all trips (Cassell et al. 2010, Devlin et al. 2010). The walkability of a city is intrinsically linked to liveability, as walking provides health, fitness, exercise, enjoyment, a sense of freedom, well-being and relaxation (Forward 1998, Hydén et al. 1998, Oxley et al. 2005). Walking also promotes social inclusion and equity within a community (Methorst et al. 2010). Furthermore, walking is the most environmentally sustainable mode of transportation and there are a broad range of social, environmental and economic benefits associated with the physical exercise gained through walking, particularly when walking trips are made instead of private motorised travel (Cassell et al. 2010).

While the benefits of increasing the number of walking trips are well established (WHO 2007), pedestrians are one of the most vulnerable road user groups, due to their lack of physical protection and limited capacity to withstand biomechanical forces (Oxley et al. 2004, Oxley et al. 2011, Palamara & Broughton 2013), particularly when involved in collisions with motor vehicles travelling at speeds higher than 30-40 km/h. Estimates suggest that pedestrians are approximately four times more likely to be injured in traffic crashes compared to other road user groups per kilometre travelled (Elvik 2009).

According to the World Health Organisation, globally there are approximately 1.35 million road traffic deaths per year and approximately 23 percent of these deaths are pedestrians (WHO 2018). In Australia, Victoria has the second highest rate per population of pedestrian injuries, compared to other States and Territories. Previous analyses have found that approximately ten percent of all police-reported serious injury and fatal crashes involve injured pedestrians (Cassell et al. 2010). Furthermore, it has been established that children, the elderly and the intoxicated are typically the most vulnerable sub-groups of pedestrians (Oxley et al. 2013) and are disproportionately over-represented in injury statistics.

To date a large proportion of pedestrian-based road safety research conducted in Victoria has tended to focus on data reported in police report crash datasets, with a small selection of studies considering hospital reported cases. However, few studies have considered pedestrian trauma across a broader spectrum of injury severity. Furthermore, the majority of pedestrian road safety research has focused on analysis of incidence and has not considered exposure measures in order to identify injury risk.

To address the limitations associated with previous pedestrian research, Victoria Walks, in conjunction with the Monash University Accident Research Centre (MUARC), with support from the Transport Accident Commission (TAC) Community Grants Scheme 2019, have undertaken this ecological study of pedestrian collisions in Victoria, Australia.

1.1 Aim

The aim of this project is to conduct an ecological study investigating the rates of pedestrian trauma in Victoria. Analyses of multiple injury register datasets were undertaken to develop a comprehensive understanding of the issues and factors associated with pedestrian injury across all levels of trauma, with a particular focus on injury resulting from collisions with other road user types.

To complement the analyses a review of the literature was conducted focusing on pedestrian road trauma in Victoria. The aim of the review was to consolidate previous research and understand key issues that have previously been identified including; injury severity, subgroups of pedestrians, crash locations, injury mechanisms, collision counterparts, injury outcomes and pedestrian exposure. Furthermore, the review was conducted to provide an understanding of the current state of knowledge regarding effective countermeasures to reduce pedestrian trauma.

The report concludes with a discussion of the key findings from the literature and the injury analyses and provides a set of recommendations for interventions and further research to reduce pedestrian trauma in Victoria.

2 Literature Review

A targeted literature review was undertaken to gain a stronger understanding of previous pedestrian injury research. The literature review was specifically focused on previous research undertaken in Victoria, however, consideration was given to interstate and international literature, particularly when identifying evidence-based countermeasures.

An extensive range of search engines and databases, available through Monash University library services, were utilised to source relevant published scientific literature.

The search covered the ten-year period 2011-2020 and the following databases were accessed:

- Google scholar
- TRID
- Science Direct
- Web of Science
- PsychInfo.

Key words included: ‘pedestrian’ ‘road safety’, ‘injury’, ‘injury severity’, ‘countermeasure’, ‘evaluation’, and ‘Victoria’.

2.1 Background

Walking has numerous benefits to individuals and to the broad community, as it can increase fitness, health and longevity for people of all ages. Walking is the original, fundamental mode of movement that is healthy, sustainable, environmentally-friendly, is also space-efficient and causes negligible harm to others. Leading a physically active life assists individuals by reducing risk of developing health complications but also can increase cognitive function and slow down functional and mobility decline. For older adults, especially, walking is particularly important for healthy ageing, physical activity, exercise, recreation and social/economic connectedness (Zuckerman et al. 1993, Garrard 2013, WHO 2015, Badawi 2018). Furthermore, environmental, social and economic benefits arise for people, as it can alleviate issues related to motorised travel such as pollution, congestion and the increasing costs associated with maintaining a vehicle and road infrastructure (Ogilvie et al. 2004, Devlin et al. 2012). Walking supports and links intrinsically to public transport, particularly trams and Light Rail Vehicles (LRVs), buses and rail, which are also to be encouraged because of their greater efficiency, support for healthy, active travel and long-term sustainability. These attributes are especially important for large and growing cities (Corben 2020).

However, pedestrians are considered vulnerable road users largely due to their lack of protection and limited biomechanical tolerance to violent forces if hit by a motor vehicle. In a collision with a vehicle, pedestrians are always the weakest party and are at a greater risk of injury or death compared with other road users (Oxley et al. 2013).

Literature Review

2.2 Contributing Factors

There is an extensive body of literature addressing and documenting the key risks to pedestrians, and the contributing factors. These include issues related to a broad range of factors, including: infrastructure in terms of a lack of dedicated facilities for pedestrians such as footpaths, crossings and raised medians; pedestrian characteristics and behaviour; driver behaviour, particularly in relation to, speeding, failing to give way, distraction, as well as drinking and driving; and vehicle design in terms of solid vehicle fronts that are not forgiving to pedestrians should they be struck. Crashes are complex and involve multiple contributing factors, and much of the literature attests to the interrelations between contributing factors (e.g., (WHO 2013, Dong et al. 2019, Thomas et al. 2019). As an example, Dong and colleagues' modelling of factors associated with injury severity as a result of a collision with a vehicle suggested that pedestrian characteristics included age and alcohol (high BAC level), driver characteristics included drink driving, previous recorded crashes and number of occupants, vehicle factors included vehicle body type, model year and travel speed, and roadway/environmental characteristics included roadway profile, intersections, light and weather conditions.

2.2.1 Road Environment and Vehicle Speed

There is a close association between the walking environment and pedestrian safety. The safety of pedestrians is compromised to a large extent by the design and operation of the road-transport system, which is generally designed for vehicles and, for the most part, seems to be unforgiving for the most vulnerable road users. Walking in an environment that lacks pedestrian infrastructure and that permits use of high-speed vehicles increases the risk of pedestrian injury. The risk of a motor vehicle colliding with a pedestrian increases in proportion to the number of motor vehicles interacting with pedestrians (WHO 2013). Pedestrian injuries generally occur more in urban areas compared with rural settings, particularly in high income countries. In the US, Nesoff et al. (2018) noted that approximately 80 percent of pedestrian fatalities occur in urban environments. This is not surprising given high traffic flow and population densities in urban areas. Arterial roads have long been identified as being problematic for pedestrians (e.g. (Zegeer et al. 2010, Turner et al. 2017, Corben 2020), predominantly as they are typically multi-lane roads with higher speeds and traffic volumes. In these environments there are often different types of road users mixing and interacting within limited road space. These road users include cars, pedestrians, cyclists, motorcyclists, commercial vehicles, buses, and other forms of public transport.

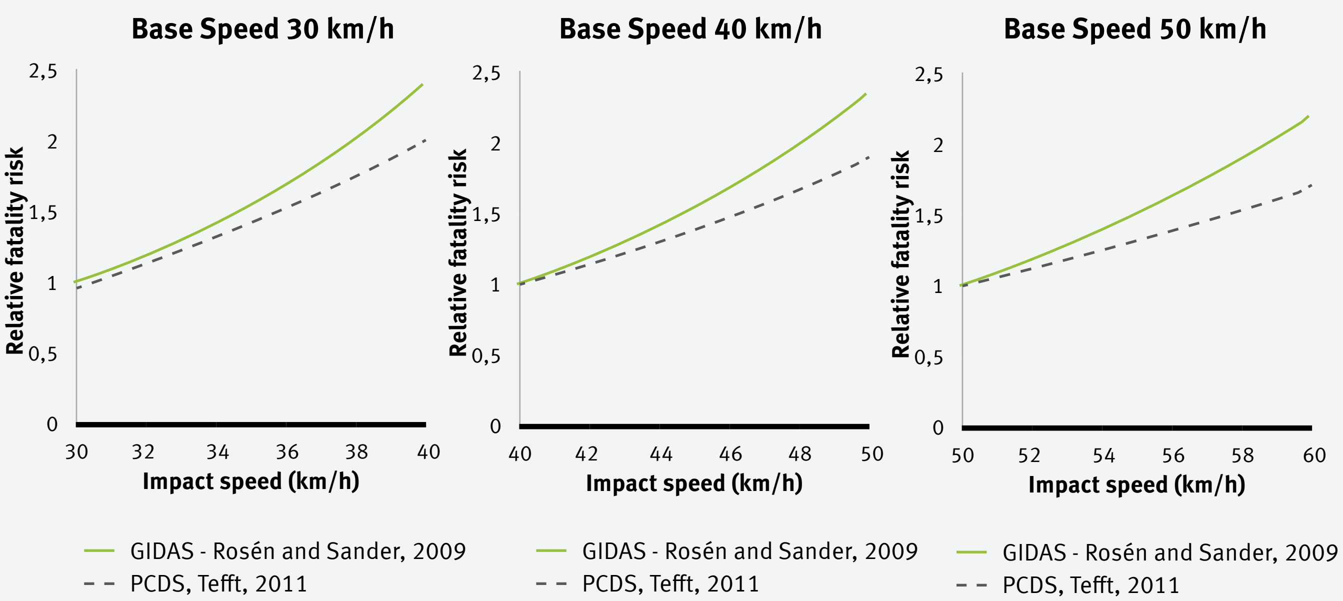
2.2.1.1 Speed and speeding

Speed and speeding has a great impact on pedestrian safety and there have been calls over many years for moderating vehicle speeds of drivers in high activity pedestrian areas (Job 1994). The relationship between impact speed and risk of fatality is strong and should be a critical factor in making decisions regarding the setting of speed limits and designing roads to reduce vehicle speeds, particularly in environments where there is a mix of vehicles and vulnerable road users (Rosén et al. 2011, Kröyer et al. 2014). The evidence shows that the higher the travel speed of a vehicle, the higher the impact speed will be, and the probability of injury, and the severity of injuries that occur in a crash, increases, not linearly, but exponentially with vehicle speed – to a power of four for fatalities, three for serious injuries and two for casualties. Even small increases in speed can result in a dramatic increase in the impact forces experienced by crash victims.

It is estimated that, for every 1 km/h increase in mean speed, the number of injury crashes will rise by around 3 percent (thus an increase of 10 km/h would result in a 30 percent increase in injury crashes) (Nilsson 1984, Tefft 2013).

One of the most recent studies estimates that the fatality risk is about 4-5 times higher in collisions between a car and a pedestrian at 50 km/h compared to the same type of collisions at 30 km/h (see Figure 1, cited in report by the International Transport Forum, 2018, https://www.itf-oecd.org/speed-crash-risk).

Figure 1: Pedestrian fatality risk and impact speed



Source: Kröyer, Jonsson, and Várhelyi (2014)

Literature Review

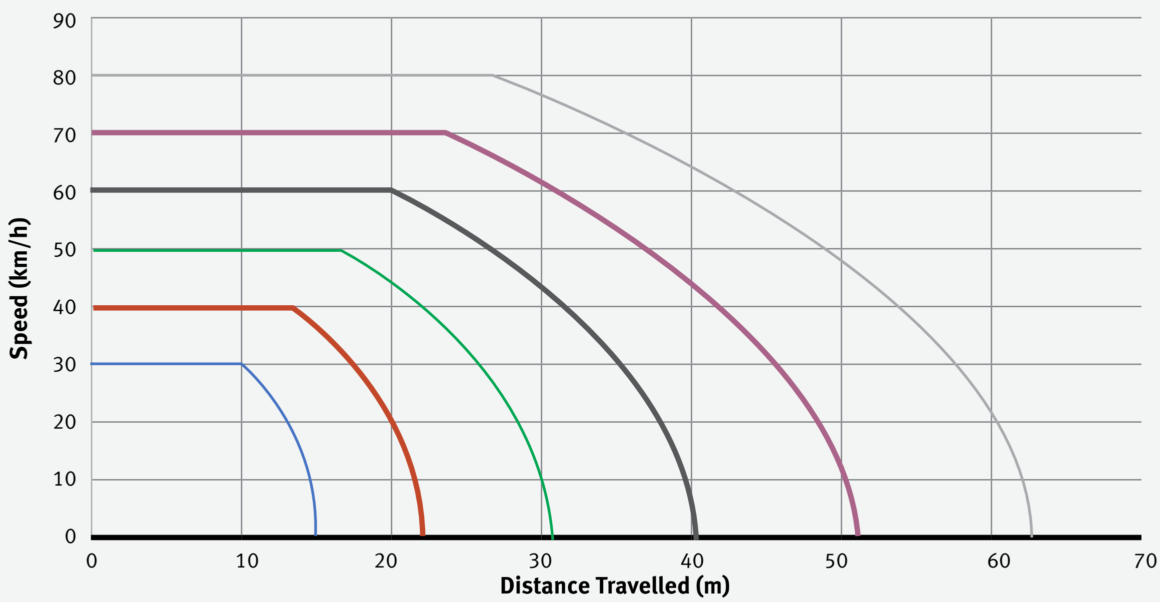
The above risk curves only account for fatalities and do not address the effects of age on injury risk. In their review of the main studies on the probability of a fatality as a function of impact speed, Logan, Corben and Lawrence (2019), favoured the use of risk curves for fatal and combined fatal/serious injury for impact less than or equal to 70 km/h (after Davis (2001), while also acknowledging the methodological shortcomings of past studies. Logan and colleagues noted that, at impact speeds of 30 km/h:

- the risk of a fatality or serious injury is around 25% for pedestrians aged up to 60 years; and
- the risk of a fatality or serious injury is around 70% for pedestrians aged 60+ years.

While the evidence on the effect of impact speed on pedestrian injury risk is strong, the effect of vehicle speed on crash risk is less clear. Traditionally, speed as a risk factor has been viewed primarily in terms of its effect on vehicle stopping distances. Higher speed also increases the distance a vehicle travels while the driver reacts to a potential collision, reducing the time available to avoid a collision (Dumbaugh & Li 2011, Corben 2020). The stopping distance of a vehicle comprises two main components:

- Perception-reaction time/distance – the distance travelled by a vehicle while the driver perceives the need to stop and then to react by activating the brakes. Typical durations for drivers are in the order of 1.2 to 1.5 seconds, but can be considerably longer for drivers who are distracted, inattentive, drowsy, slowed by age or otherwise performing below population averages; and
- Braking distance – the distance required by a vehicle to come to a stop, from the point where the brakes were applied. These distances are determined by physics, and in particular the initial speed of the vehicle. The higher the speed of a vehicle, the shorter the time a driver has to stop and avoid a crash, including hitting a pedestrian.

Figure 2: Stopping distances of typical passenger cars for a range of initial travel speeds (calculations assume a coefficient of friction of 0.70 and a driver perception-reaction time of 1.2 seconds) (Corben 2020)



Literature Review

In addition, the quantity of information to be processed by a driver increases significantly as vehicle speed increases. Given the limitations of cognitive, attentional and visual systems, these can be overloaded when driving at high speed and can result in reduced predictability, reduced ability to control the vehicle, and reduced ability to detect, negotiate and maneuver around obstacles on the roadway (Wolfe et al. 2017).

Speed limits, and their relationship to road trauma, have been broadly researched. This has usually been undertaken by examining the effect of a change in speed limit (e.g., Farmer (2017), Hoareau et al. (2006), Vadeby & Forsman (2013), Nishimoto et al. (2019) and Mackenzie et al. (2015).The clear majority of these types of studies found that when speed limits were increased, injury crashes also increased and that when speed limits were decreased, injury crashes also decreased. This prior research has led to the general conclusion that lowering speed limits reduces the severity of crashes. Some Australian examples include:

- Doecke et al. (2018) examined the relationship between speed limit and injury severity for different crash types, using police-reported crash data in order to provide empirical evidence for safe speed limits that will meet the objectives of the Safe System. A positive exponential relationship between speed limit and fatality rate was found. For an example fatality rate threshold of 1 in 100 crashes it was found that safe speed limits are 40 km/h for pedestrian crashes; and
- In Victoria the default speed limits were reduced from 60 km/h to 50 km/h in built up areas in 2001. Hoareau et al. (2006) conducted an evaluation of the change in default speed limits and estimated that fatal and serious injury crashes involving pedestrians were reduced by 25 to 40%.

This evidence clearly shows that pedestrians are only safe mixing with traffic travelling at 30-40 km/h and has been instrumental in promoting lowered speed limits and supporting traffic calming in built up areas (strip shopping centres, residential streets, etc.). However, there remains some contention among researchers about whether 30 km/h accurately defines the boundary condition for Safe System risk levels. The contention centres largely on experimental methods used in collecting data on crashes and the potential for bias in sampling. Numerous research studies have been undertaken on this topic and, while each has strengths and weaknesses, overall there is a lack of clear and precise consensus. Jurewicz et al. (2016) present risk curves that suggest pedestrian-vehicle impact speeds of around 20 km/h should not be exceeded if Safe System criteria are to be met. This is based on the following criteria:

- injury severity, given a crash, is proportional to impact speed;
- crash likelihood affected by road geometry and road user behaviour; and
- exposure to crash risk is proportional to average traffic flows.

2.2.1.2 Road design

Pedestrian risk is increased when roadway design and land-use planning fail to plan for and provide facilities such as footpaths, or adequate consideration of pedestrian access at intersections (Sleet et al. 2011, WHO 2013). Infrastructure facilities and traffic control mechanisms that separate pedestrians from motor vehicles and enable pedestrians to cross roads safely are important mechanisms to ensure pedestrian safety, complementing vehicle speed and road system management (Zegeer et al. 2010, Sleet et al. 2011, WHO 2013, Hu & Cicchino 2018).

Stephan (2015) investigated the factors influencing crash risk on arterial strip shopping centre road segments in Melbourne and found that the design of the road, roadside, traffic volumes and the facilities and amenities in the surrounding environment were associated with crash risk. The effect of some risk factors differed by crash type. Wider carriageways were associated with reductions in multi-vehicle crashes (MVC) and single-vehicle crashes (SVC), however, they were also associated with increases in pedestrian-vehicle crashes. The presence of off-street parking facilities was also associated with reductions in MVC and SVC, but increases in crashes involving pedestrians. It is therefore essential to consider the effect of changes in road design and operational objectives on the safety of all road users. Other risk factors had a consistent effect across crash types. As the number of unsignalised intersections per km increased, so did the incidence of MVC and crashes involving pedestrians.

The presence of roadside parking on both sides of the road increased the risk of an MVC, while the presence of parking clearways was associated with reductions in pedestrian-vehicle crashes. Situations of potential conflict are therefore a concern for all road users. Reductions in the speed limit appear to be of particular benefit to vulnerable road users in strip shopping zones. The incidence of pedestrian-vehicle crashes was reduced on roads with a permanent 40 or 50 km/h speed limit, in comparison to roads with a 60 km/h speed limit.

Mansfield et al. (2018) explored associations between transportation system and built environment characteristics and pedestrian fatalities between 2012 and 2016 at the Census tract scale across the United States. They noted that traffic on certain roadway facility types and employment in certain sectors have especially strong associations with pedestrian fatality risk. Specifically, in urban tracts, strong associations were found between traffic on non-access-controlled principal arterial and minor arterial roadways and pedestrian fatalities (0.91 and 0.68 additional annual pedestrian fatalities per 100,000 persons per 10,000 VMT/mi2 increase in traffic density, respectively). In both urban and rural tracts, they also found strong associations between employment density in the retail sector and pedestrian fatalities.

Hu & Cicchino (2018) examined pedestrian fatalities in the US by roadway, environmental, personal and vehicle factors between 2009 and 2016. They noted that the largest increases in pedestrian deaths during this period occurred in urban areas (54% increase), on arterials (67% increase), at non-intersections (50% increase), and in dark conditions (56% increase).

Olszewski et al. (2019) examined factors affecting fatality risk of pedestrians, cyclists, motorcyclists, and moped riders in seven EU countries using the CARE database (the European centralised database on road accidents), with a focus on identification of road infrastructure-related conditions and factors that have a negative impact on vulnerable road user traffic safety. Between 2009 and 2013 pedestrians comprised most fatalities (47%), followed by motorcyclists (28%), cyclists (19%), and moped riders (6%). The effect of darkness on fatality risk was negative for all categories of vulnerable road users, however, on average, the strongest effect was clearly for pedestrians. This is consistent with the findings of other studies (Johansson et al. 2009, Gaca & Kiec 2013) and confirms the importance of good lighting of intersections and road segments in general and especially those heavily used by pedestrians.

In addition, there is evidence that injury risk is associated with poor visibility of pedestrians. Inadequate visibility of pedestrians arises from:

- inadequate, or lack of, roadway lighting;
- vehicles and bicycles not equipped with lights; and
- pedestrians sharing road space with fast-moving vehicles.

2.2.2 Pedestrian Characteristics and Behaviour

Statistics and research alike suggest that older adults, children and the intoxicated are at highest risk of a pedestrian collision, and that injury severity increases as age increases. There are additional emerging potential risk factors including distraction.

Chong et al. (2018) reported 47,789 deaths and 674,414 injuries from pedestrian–motor vehicle collisions in the U.S. from 2006 to 2015. Over this time, there was a significant increase in fatalities within a number of US States. Fatality rates were consistently high among the elderly, whereas injury rates were highest in adolescents and young adults. Factors associated with increased risk of pedestrian death after a motor vehicle collision included male sex, aged 65 years or older, pedestrian or driver alcohol use, the collision occurring during overnight hours (i.e., midnight to 5:59AM) at non-intersections, and if the collision involved a heavy vehicle.

2.2.2.1 Children

Young children's safety as pedestrians is of particular concern in view of their vulnerability in traffic situations and the special value society places on children (Oxley 2005, Morrongiello & Barton 2009). Young children are particularly vulnerable as pedestrians for a number of reasons, including:

- They are immature and have less developed cognitive, attentional, perceptual and visual skills than older children;
- They are more likely to be distracted by irrelevant information and experience more difficulty controlling impulsive reactions compared with older children and adult pedestrians;
- They are inexperienced in traffic and are unable to independently make safe judgements concerning the speed and distance, and therefore time of arrival of approaching traffic when crossing vehicle paths. This ability to recognise and respond safely to traffic hazards remains under-developed, for the most part, throughout their primary school years;
- They experience difficulty choosing a safe crossing location (often involved in 'dart out' collisions from in between parked vehicles);
- They are less confident in traffic;
- They are small in stature and, therefore, have greater difficulty seeing hazards in traffic and being seen by motorists; and
- Because of their small stature, in a crash they are more likely to be struck in the head or upper body, both areas having an elevated risk of producing severe injury. Additionally, their size makes them more likely to be driven over in a vehicle impact. Thus, even at low impact speeds, when the risk of serious injury is relatively low for pedestrians in general, injury risks to young children remains high due to their greater susceptibility to being run over by an impacting vehicle (Whitebread & Neilson 2000, Zeedyk et al. 2002, Sarkar et al. 2003, Tabibi & Pfeffer 2003, Barton et al. 2007, Christie et al. 2007).

There is evidence that children aged below 10 years, have relatively poor skills at reliably setting safe distance gap thresholds, and thus do not consistently make safe crossing decisions (Connelly et al. 1998). It has been suggested that children's poor skills at selecting appropriate gaps in traffic are due to the fact that distance, rather than an approaching vehicles speed, is a primary factor in determining gap acceptance thresholds (Connelly et al. 1996, Connelly et al. 1998, Simpson et al. 2003)

2.2.2.2 Older adults

Older adults are over-represented in pedestrian fatalities and are at an increased risk of severe injury due to their frailty compared to young adults. Older adults are more likely to sustain fractures to all body parts in a crash, their recovery time is high, and the likelihood of long-term disability is high. A large component of the literature on older road users is concerned with the consequences of ageing on sensory, visual, perceptual and cognitive abilities. Inadequate functioning in any of these areas can reduce performance and increase risk on the road. While onset of age-related changes can affect many areas of daily living, it is important to recognise that older road users are generally safe and cautious. Indeed, there is good evidence to suggest that older road users in Australia self-regulate their travel patterns by adopting cautious behaviours (Charlton et al. 2006). Older pedestrians, too, appear to adopt self-regulatory and cautious behaviours while crossing the road (Oxley et al. 1997).

However, it may be that a number of older road users are less able to compensate for age-related changes and therefore may be at an increased risk. When demands are significantly complex, in situations such as selecting safe gaps in the traffic, some older pedestrians may experience difficulties. A large body of literature suggests that some older adults make risky crossing decisions and experience difficulties selecting safe gaps in order to accommodate their slower walking speeds and are less confident on the streets (Dommes & Cavallo 2011, Dunbar 2012, Zhuang & Wu 2012, Dommes et al. 2015, Kim 2019)

2.2.2.3 Intoxicated pedestrians

A substantial proportion of pedestrian deaths and serious injuries involve intoxicated pedestrians. According to the Transport Accident Commission (2009), in Victoria 30 percent of all pedestrians involved in a fatal collision in 2008 had a BAC of at least 0.05g/100ml, and the risk of a fatal outcome increased as BAC level increased.

An investigation of pedestrian deaths showed that almost half the pedestrians killed in Australia (45%) were walking while intoxicated (ATSB 2001), and approximately 1 in 3 had a BAC exceeding 0.08 to 0.1 g/dl. (Cairney et al. 2004). More recent data from Queensland indicates that this situation has not changed (TMR, 2012). Based on Queensland statistics of injured 'drink walkers', the following pedestrian groups are at heightened risk of being killed or seriously injured whilst 'drink walking':

- Males (in 2011, 66.7% were male);
- 30-39 year olds (in 2011, 33.3% were aged in their thirties);
- Younger persons (in 2011, 26.7% were aged 17-20 years), often due to their heightened risk of binge drinking engagement in drink walking (Haque et al. 2012) ; and
- Indigenous pedestrians. Pedestrian casualties show a disproportionate number of Indigenous people, and Indigenous pedestrians that are struck by a vehicle often have high BAC's. For the 2001/02 to 2005/06 Queensland data period, of the 175 Indigenous people killed or hospitalised as a pedestrian, 53.7% were under the influence of alcohol (compared to 20.2% of the non-Indigenous people killed or hospitalised as a pedestrian) (TMR, 2012).

Eichelberger et al. (2018) investigated the prevalence, trends, and characteristics of alcohol-impaired fatally injured pedestrians and bicyclists in the US. Data from the Fatality Analysis Reporting System (FARS) were analysed for fatally injured passenger vehicle drivers, pedestrians, and bicyclists 16 and older during 1982–2014. Logistic regression models examined whether personal, roadway, and crash characteristics were associated with high blood alcohol concentrations (BACs) among fatally injured pedestrians and bicyclists. During this period, the proportion of fatally injured pedestrians with high BACs (≥0.08 g/dL) declined from 45 to 35 percent. The largest reductions in alcohol impairment among fatally injured pedestrians and bicyclists were found among ages 16–20. During 2010–2014, fatally injured pedestrians and bicyclists aged 40–49 had the highest odds of having a high BAC, compared with other age groups.

In contrast, Hezaveh & Cherry (2018) identified crashes between motor vehicles and pedestrians who were walking while alcohol-impaired in Tennessee. Results indicate that the number of fatally injured alcohol-impaired pedestrians has increased since 2011. Alcohol was present in 7 percent of the pedestrian crashes. Tested pedestrians averaged BAC levels of 0.17 g/dL. As pedestrian injury severity increased, the share of the alcohol-impaired crashes increased. Analysis also revealed that 83 percent of the alcohol-impaired crashes occurred during the night; moreover 54 percent of crashes occurred on weekends, 69 percent at a mid-block section of the road, and 85 percent at areas with no traffic control device. Results of a binary logit regression indicate that pedestrian's age, males, posted speed limit, and night-time crashes had a positive association with the crashes. On the other hand, urban context, intersection crashes, driver manoeuvres (i.e., parking-related, turning, and straight), and daylight had a negative association with the WUI crashes.

Öström & Eriksson (2001) also stated that intoxicated pedestrians suffered more head injuries compared to non-intoxicated pedestrians. Dultz & Frangos (2013) confirmed that intoxicated pedestrians usually sustain more severe injuries, which required longer duration hospital stays.

Given the overwhelming evidence of alcohol impairment on many tasks, particularly driving (Lenne et al. 1999), it is entirely possible that decreased cognitive functioning and inhibition would effect judgement and performance when crossing roads. Unfortunately, there are few studies exploring the effect of alcohol impairment on pedestrian performance. In a simulated road-crossing study, adults with BACs of 0.07–0.10 g/dL had difficulty integrating speed and distance information when selecting gaps in traffic compared with controls who did not ingest alcohol (Oxley et al. 2006). Dultz et al. (2011) found that among crash-involved pedestrians treated at a trauma center, those who had been drinking were more likely at the time of the crash to have crossed the road at a dangerous location, such as at an intersection against the traffic signal or midblock without a traffic signal, than pedestrians who had not been drinking.

2.2.2.4 Distraction

The nature of driver distraction has been well documented in research over recent years (e.g. Klauer et al. (2006); Brodsky (2018); however, less is known about the occurrence of pedestrian distraction. The number and complexity of potentially distracting technologies used by pedestrians (e.g. smartphones) is likely to further rise over the next decade and, as a road user group, pedestrians are particularly vulnerable to being fatally or seriously injured in collisions with other road users.

A number of studies suggest that device use while walking is common, and that their use can affect behaviour and performance. An experimental study demonstrated that mobile phone users walked more slowly, changed direction more often and had poorer observational skills than other walkers, including those using a music player (Hyman et al. 2010).

A systematic review of studies to evaluate increased risk for crashes/near-crashes for youth pedestrians, cyclists and drivers while distracted was recently undertaken by Stavrinos et al. (2018). The findings related to pedestrian distraction were as follows: the 5 distracted walking studies utilized either experimental designs with virtual reality pedestrian environments (Stavrinos et al. 2009, Chaddock et al. 2012, Byington & Schwebel 2013, Parr et al. 2014) observational strategies (Thompson et al. 2013). Developmental differences were minimal: Mobile technology use impaired pedestrians' visual attention to traffic in children ages 10–11 (Stavrinos et al. 2009) as well as emerging adults (Byington & Schwebel 2013, Thompson et al. 2013). When distracted by visually demanding tasks (e.g., texting), pedestrians waited longer, missed more opportunities to cross safely (Byington & Schwebel 2013), and crossed more slowly (Parr et al. 2014). Step width, toe clearance, step length and cadence also diminished while texting (Parr et al. 2014). In observational field research, texting pedestrians were more likely to cross unsafely (Thompson et al. 2013). When distracted cognitively but not visually demanding tasks (e.g., phone call), pedestrians waited significantly longer to cross, missed more opportunities to cross safely (Stavrinos et al. 2009), and crossed more slowly (Thompson et al. 2013).

A recent observational study of pedestrians crossing roads at eight city sites in Melbourne, Australia during daytime conditions (Horberry et al. 2019) revealed that, on average, 20 percent of pedestrians were using their smartphones when crossing roads, significantly more critical events occurred with smartphone users compared to non-smartphone users, and that the pattern of critical events was different for smartphone and non-smartphone users.

Other studies suggest similar use of devices while walking. For example, Williamson & Lennon (2015) undertook intercept interviews among pedestrians in New South Wales and found self-reported frequency of smartphone use for potentially distracting activities whilst walking or crossing a road was high, especially among 18–30 year-olds. Thirty percent of this age group indicated they engaged in texting or accessed the internet on their smartphones at least once a week whilst crossing the road.

Moreover, the naturalistic observational literature typically suggests a range of unsafe behaviours: smartphone-distracted pedestrians were less likely to wait for the crossing light, to look left and right before crossing the street or to make eye contact with approaching drivers (Basch et al. (2014), Brumfield & Pulugurtha (2011), Bungum et al. (2005), Cooper et al. (2012), Hamann et al. (2017), Thomas et al. (2013), cited in Horberry et al. (2019).

While the evidence suggests that a small proportion of pedestrians might possibly be distracted by smart phone use while crossing the street, we are not aware of any studies that have established a significant connection between pedestrian smart phone use and actual crashes.

Smart phone use by drivers is likely to be a more significant threat to pedestrian safety than smart phone use by pedestrians. For example, a study by the New York City Department of Transportation concluded, after considering both local and nation-wide data "distracted walking is a very minor contributor to pedestrian death and injury. Ultimately, interventions that lead to more responsible driving behaviour are the key to driving down fatalities throughout the city" (New York City Department of Transportation 2019).

2.2.3 Driver Characteristics and Behaviour

Driving at high speed in areas of high pedestrian activity, driving while impaired and while distracted, as well as poor attitudes to pedestrians and poor compliance have been identified as key driver-related factors that contribute to increased pedestrian risk (Summala et al. 1996, Preusser et al. 2002).

The impact of speed has been noted above, and it is also important to understand the driver factors that are associated with choosing a travel speed. Many drivers exceed the speed limits and there are a number of contributing factors that may explain why many drivers continue to drive at high speeds. Few drivers realise that risk level increases rapidly with higher speed because it is impossible to monitor these risks. Also, crash risk is seldom associated with increased speed. It is noted in the literature that speed choice is affected by a number of drivers' social and psychological factors and other characteristics (Kanellaidis et al. 2000, Oxley et al. 2004). The following factors contribute to a driver/rider's choice of speed:

- The reinforcement of habitual speeding behaviour as drivers build up a history of driving at higher speeds than the posted speed limit without crashing;
- Risk perception of risk (including perception of appropriate speed, crash risk and being caught for speeding);
- Rewarding aspects of speeding including excitement, and demonstrations of skill or courage;
- Personal characteristics such as age, gender, driving experience, risk acceptance and risk-taking behaviour;
- A driver's specific motivations associated with the trip such as immediate time savings;
- Type of road and road design features (including speed limit) and traffic condition;
- Level of alcohol or other drug impairment;
- Ownership of the vehicle; and
- Presence of passengers in the vehicle.

In addition to speed choice, distracted driving can contribute to pedestrian risk. While it is noted above that the nature of driver distraction has been well documented over recent years, little attention has been directed to the risk to pedestrians. One study was found that suggested that a possible contributor to increased pedestrian fatalities may be an increase in distracted driving because of increasing mobile phone usage. Cong and colleagues (2018) found that 44 percent of all adults report that they have been in a car when the driver used the mobile phone in a way that put themselves or others in danger. The exact effect of distracted driving on pedestrian injuries, however, is not known.

Literature Review

The most recent comprehensive systematic review of the literature on driver distraction among young drivers is provided by Stavrinos and colleagues (2018), and summarised below (all studies below cited by Stavrinos et al. (2018).

- Various methodological approaches were used, including experimental driving simulator studies, instrumented vehicles on predetermined routes, and observational/ naturalistic studies involving in-vehicle recording devices;
- Novice and experienced drivers were both impacted by mobile technology use (Schwebel et al. 2012);
- Though interacting with a phone resulted in significantly more lane deviations by teen drivers compared to older, more experienced drivers (Greenberg et al., 2003; Wikman et al., 1998), as did phone dialling (Reed-Jones et al., 2008);
- Across studies, visually demanding mobile technology tasks (texting) diverted drivers' attention from the forward roadway (Farmer, Klauer, McClafferty, & Guo, 2015a; Foss & Goodwin, 2014; Greenberg et al., 2003; Hosking, Young, & Regan, 2009; Kingery et al., 2015; Neale, Dingus, Klauer, Sudweeks, & Goodman, 2005; Wikman, Nieminen, & Summala, 1998);
- The effect of texting on response time produced mixed results, with several studies suggesting it significantly slowed driver response (Drews et al., 2009; He et al., 2015; Sawyer et al., 2014; Simons-Morton et al., 2015) and one reporting no effect (Hosking et al., 2009);
- Sending text messages led to more lane position variability and more lane excursions (Hosking et al., 2009), behaviors which were mediated by extended eye glances off the road (Kingery et al., 2015);
- Overall, speed was found to be highly variable, but significantly slower, when engaged in the visually demanding tasks associated with cell phone use while driving (Narad et al., 2013; Stavrinos et al., 2013; Farmer, Klauer, McClafferty, & Guo, 2015b), and speed increased after a call ended (Reimer, Mehler, D'Ambrosio, et al., 2010). Other research found visual phone interactions to be associated with increases in speed over short durations (Farmer et al., 2015; Reed-Jones et al., 2008). While texting, adolescent drivers' speed has been found to be either faster (Stavrinos et al., 2015) or not impacted (Reimer, Mehler, Coughlin, et al., 2010; Sawyer et al., 2014);
- Cognitively, but not visually, demanding tasks of phone conversations did not influence visual attention in naturalistic or simulated settings (Farmer et al., 2015a; Kingery et al., 2015; Kingery et al., 2015). Such cognitively-distracting tasks did, however, cause young drivers to take incorrect exits (Gaspar et al., 2014), miss turns (Kass et al., 2007) and mirror checks (Pereira et al., 2009), pause excessively at stop signs (Reimer, Mehler, Coughlin, et al., 2010; Reimer, Mehler, D'Ambrosio, et al., 2010), and proceed through yellow light indicators (Xiong et al., 2016). Conversing on phones slowed driver response time in three studies (Bellinger et al., 2009; Horberry, Anderson, Regan, Triggs, & Brown, 2006; Strayer & Drews, 2004), but not in a fourth (Narad et al., 2013); and
- A few reports of increased safety during phone conversations are published (e.g., when drivers were engaged in a hand-held phone conversation, they exhibited less variability in lane position (Tractinsky et al., 2013) and fewer lane changes (Stavrinos et al., 2013). Phone conversations also led to slower (but more variable) speed while driving (Brown, Horberry, Anderson, Regan, & Triggs, 2003; Horberry et al., 2006; Reimer, Mehler, D'Ambrosio, et al., 2010; Tractinsky et al., 2013). These safer behaviours may represent compensatory strategies.

In studies comparing visually distracting tasks to cognitive distracting tasks, texting resulted in more variability in lateral position on the roadway compared to phone conversation (Stavrinos et al., 2013, 2015), no distraction (Drews et al., 2009; He et al., 2015; Narad et al., 2013; Stavrinos et al., 2013) and using Google Glass (He et al., 2015; Sawyer et al., 2014).

Last, there is some evidence suggesting poor attitudes by drivers towards vulnerable road users. There is some evidence that the perception that vehicles have higher status on the road compared with pedestrians and consequent behaviour of drivers may contribute, in part, to increased risk of pedestrian crashes (Summala et al. 1996, Hydén et al. 1998, Preusser et al. 2002).

Literature Review

Many of the problems for pedestrians and cyclists stem from the fact that the modern traffic system is designed largely from a car-use perspective and other transport modes such as walking and cycling have a low status. Hydén et al. (1998) argued that this is primarily because of the fact that pedestrians and cyclists do not pose a threat to car occupants, therefore they are not afraid of them. The protective behavioural patterns of drivers do not therefore take enough account for unexpected and sudden movements of weaker (vulnerable) road users.

Retting et al. (1999) noted some concern that urban drivers are operating more aggressively, with less regard for traffic law and the vulnerability of other road users. Indeed, there have been many calls for moderating vehicle speeds of drivers in high activity pedestrian and cycling precincts (Job 1994, Oxley et al. 2001).

A recent study by Nesoff et al. (2018) examined knowledge, attitudes, and behaviour regarding pedestrian safety, awareness of relevant traffic safety laws, and effective strategies that could improve pedestrian safety using an online survey within a community in Maryland, US (n=3,808). They found that more drivers than pedestrians reported that pedestrian safety was an important problem (73 and 64%, respectively), a large proportion of respondents incorrectly reported the existing state laws addressing right of way, fines, and enforcement, with significant differences between drivers and pedestrians. Significantly more pedestrians than drivers supported changing traffic signals to increase crossing time, and significantly more drivers supported creating structures to prevent midblock crossing.

2.2.4 Vehicle Design

Current design of vehicle frontal structures and vehicle mass of both passenger cars and other larger vehicles contributes significantly to the severity of injuries sustained in a collision. Pedestrians struck by a car or four-wheel-drive vehicle with high bumpers and more blunt frontal profiles, are more likely to incur serious head, thoracic, abdominal and spinal injuries than when struck by a bonnet-type passenger car. In contrast, as passenger cars are becoming more aerodynamically streamlined and have lower bumpers than vans, utilities and four-wheel-drives, pedestrians struck by a newer passenger car are much more likely to incur a leg injury (Maki et al. 2003, Ballesteros et al. 2004, Lefler & Gabler 2004). Evidence suggests that children are more likely to be thrown or knocked down by light truck vehicles than passenger vehicles resulting in more serious injuries to the upper extremity and abdomen (Roudsari et al. 2005).

The relationship between vehicle type and pedestrian fatality was investigated in a study conducted by Paulozzi (2005). Paulozzi (2005) estimated that compared with passenger vehicles, the relative risk of a pedestrian fatality per mile travelled in the US in 2002 was; 7.97 for buses, 1.93 for motorcycles, 1.45 for light trucks and 0.96 for heavy trucks (Paulozzi 2005). Furthermore, pedestrian fatalities caused by a collision with a bus were more likely to involve children and adults aged above 85 years, while pedestrian fatalities caused by a motorcycle were more likely to involve children aged 0 to 14 years of age. In accordance with previous studies, Paulozzi also found a greater risk of pedestrian fatalities in urban compared to rural areas.

With the recent rise in popularity of sport utility vehicles (SUVs), minivans and four-wheel-drive vehicles in many countries, the issue of vehicle design and use of particular vehicle types is becoming more relevant to pedestrian and cyclist safety (Ballesteros et al. 2004). The typical trajectory for a person colliding with a SUV or LTV vehicle front involves initial bumper contact with the upper leg (pelvis/chest for child), above their centre of gravity; such that “wrap and carry” and rotational movement are less likely, and forward projection followed by being over-run by the vehicle is more likely (Roudsari et al. 2004, Simms & Wood 2006, Hardy et al. 2007). The head is more likely to make contact with the bonnet top (bonnet leading edge for a child) than with the windshield and at a lower impact velocity due to the reduced rotation, an event which is expected to be more pronounced in taller SUVs (Hardy et al. 2007, Kerrigan et al. 2012). Loads sustained by the pelvis are expected to be substantially higher, and contact with the stiff engine structures are expected to contribute to head injuries (Simms & Wood 2006). Furthermore, the fitting of rigid bull-bars to many large vehicles is of great concern to pedestrian safety.

In an observational study of vehicles in Adelaide, Doecke et al. (2008) reported that 45.4% of four wheel drive vehicles and 49.4% of work utilities were fitted with bull-bars. Desapriya et al. (2012) reviewed the literature addressing rigid bull bars on vulnerable road user safety and noted that vehicles fitted with bull bars, particularly those without deformable padding, concentrate crash forces over a smaller area of vulnerable road users during collisions compared to vehicles not fitted with a bull bar. Rigid bull bars, such as those made from steel or aluminium, stiffen the front end of vehicles and interfere with the vital shock absorption systems designed in vehicle fronts. The authors concluded that these devices significantly alter the collision dynamics of vehicles, resulting in an increased risk of pedestrian injury and mortality in crashes.

Most pedestrian injuries as a result of a collision with a vehicle affect the head and the lower extremities (Hu & Klinich 2015). A number of studies suggest that the design of vehicles, particularly frontal structures and their design influence pedestrian injury risk and there is evidence that particular vehicle types seem to present a higher injury risk to pedestrians (D’elia & Newstead 2015).

Fredriksson et al. (2010) examined pedestrian crash risk and injury outcomes and their relationship with vehicle design and reported the most frequent serious injury (AIS 3+) passenger car-pedestrian mechanisms: for all ages, the most frequent relationships were: leg to front end (44%), head to windscreen (25%, with 52% of these hitting impacting glass and 39% impacting the A-pillars), chest to bonnet (15%) and chest to windscreen. Also in agreement, the second most frequent mechanism was found to be different for children than for seniors and adults: head-to-bonnet occurred with greater frequency than head-to-windscreen (Roudsari et al. 2004, Fredriksson et al. 2010). The most common mechanism for fatalities was head-to windshield, followed by thorax to hood/windshield (Fredriksson et al. 2010).

This is supported by Hu & Klinich (2015) who found that most head injuries result in damage from the bonnet (particularly among children), windshield and A-pillars, while the majority of lower limb extremities injuries are due to the front bumper. Frontal design is particularly an issue for young pedestrians as the height of, for example, an SUV results in reduced visibility of shorter pedestrians, and more severe injuries occurring to the chest and head areas. In addition to physical design, MPVs are less compliant than low profile passenger vehicles, which increases the risk of more severe injury should a pedestrian collision occur Hu & Klinich (2015).

D'elia & Newstead (2015) summarised the effects of vehicle design on pedestrian injury risk, as follows:

- increased speeds have the largest effect on torso injury severity, and the largest effect on older adults;
- at 50 km/h, lower extremity serious injuries are more likely than torso or head injuries;
- bumpers are the first impact point and cause the highest percentage of serious injuries and disability, injuring primarily the lower extremities, but may cause injuries higher up the body (femur and pelvis in adult and torso and head in children) if the vehicle is an SUV or truck, and may offer no protection if the vehicle is fitted with a bull-bar;
- bonnet surface and leading edge impacts are primarily responsible for fatal and serious adult torso and child head injuries in passenger vehicles and adult head injuries in SUVs and vans;
- torso injuries are more prevalent than head injuries when the vehicle is an SUV and the reverse is true for passenger cars;
- windshields, particularly the A-pillars are responsible for adult head injuries, which are more often fatal;
- over recent years, vehicle front geometry has become more blunt, with one cause being the increase in popularity of SUVs and utilities;
- geometry rather than mass of vehicle is the key factor explaining the injury risk differences observed for SUVs and vans when compared with passenger vehicles, however the effect of vehicle type appears only to be significant at lower speeds, whereupon speed has the most influence on pedestrian outcome;
- SUVs have a greater risk of collision with a pedestrian and a greater chance of producing a more severe injury or fatality than a passenger car; and
- vehicle design and frontal geometry contributes to the risk of a pedestrian collision through reduced pedestrian visibility.

3 Crash Data Analysis

3.1 Datasets

Analysis of various Victorian road crash, injury outcome and exposure datasets were undertaken to enhance our understanding of current pedestrian injuries in Victoria. Details of each dataset are provided in the following section.

3.1.1 Victoria Police Accident Records System (VPARS) – Transport Accident Commission (TAC) Claims Data

This dataset is an extract from the Victoria Police Accident Records System (VPARS) linked to the Transport Accident Commission (TAC) claims dataset. The VPARS dataset includes a record of all police reported casualty crashes. The linked dataset is administered by the Transport Accident Commission (TAC) and includes data on TAC claims for injury compensation from road crashes. Linked cases from the dataset were extracted for all pedestrian injuries between 2009 and 2018.

To complement the VPARS data, a summary vehicle registration data for Victoria was gathered from previously published reports. The data provides counts of the number of registered vehicles by vehicle type from 2009 to 2018 and provides an indication of pedestrian exposure to collision counterparts.

3.1.2 Victorian Injury Surveillance Unit

Injury data involving pedestrians were collected through analysis of the Victorian Injury Surveillance Unit (VISU) datasets. The VISU holds hospital-treated injury data at two levels of severity: hospital admissions and Emergency Department (ED) presentations. De-identified unit record files on Victorian hospital admissions and ED presentations are provided to VISU by the Department of Health. The VISU dataset includes both the Victorian Admitted Episodes Dataset (VAED) and the Victorian Emergency Minimum Dataset (VEMD). The VAED records all hospital admissions in public and private hospitals in the state of Victoria and the VEMD records all presentations to Victorian public hospitals with 24-hour EDs (excluding patients who are subsequently admitted to hospital). VISU data was accessed and all pedestrian cases between 2008 and 2017 were extracted for analysis, which represented the most current data available at the time of writing this report.

For cases in the VAED, the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification external cause codes (ICD-10-AM) were used to extract data (ACCD 2017). Cases were extracted from the VAED that met the following criteria:

- The external cause code was in the range V00-V09 "pedestrian injured in transport accident";
- Principal diagnosis was a community injury (S00-T75 or T79 ICD 10 AM code); and
- Human Intent: "Non-intentional harm"

Admissions as a result of transfer from another hospital or due to a statistical separation from the same hospital were excluded. All admitted cases identified using this method of identification were included in the analysis.

The VEMD is an ongoing surveillance dataset of injury presentations to 39 Victorian public hospital emergency departments. The VEMD data is collected in accordance with National Minimum Data Standards (NMDS) for injury surveillance. While data is not coded using the ICD-10-AM system, the code set in the VEMD is similar and comparable. Cases recorded in the VEMD were extracted if the injury cause code related to pedestrians and the cases were coded as non-intentional harm. The description of event text variable was manually checked to ensure cases were relevant, cases were limited to incidence (that is return visits), and pre-arranged admissions were excluded.

3.1.3 Pedestrian Deaths Registered in Victoria

Pedestrian deaths in Victoria were extracted from the National Cause of Death Unit Record File (COD URF) for deaths registered during the period 2008 to 2017. This represented the most current data available, with finalised data available for the period of 2008 to 2015, revised data available for 2016 and only preliminary data available for 2017. As such the number of cases are likely to be revised in the future for 2016 and 2017.

For cases in the COD URF, the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification external cause codes (ICD-10-AM) were used to extract data (ACCD 2017). Deaths were extracted from the dataset that were recorded in Victoria and where the underlying cause of death was in the range V00-V09 “pedestrian injured in transport accident”.

3.1.4 Victorian Integrated Survey of Travel and Activity (VISTA)

Measures of exposure for walking were gathered through analysis of two recent VISTA household travel surveys conducted in Victoria, Australia. The surveys collected data across Melbourne, Geelong and regional centres in Victoria. Participating households were asked to complete a travel diary on a single day. Results of the surveys are weighted to represent annual travel patterns in 2009 and 2014-2016 for the broader population of Victoria. The exposure measures considered in the analysis were population, distance travelled, and number of trips.

3.2 Data Analysis

Descriptive analysis techniques were utilised to examine available crash and injury data. Analyses included cross tabulation and Pearson’s chi-squared tests (x^2) to examine relationships between factors and to identify associations between sub-groups of pedestrians and factors. Analyses were undertaken at a level of significance (α) of 0.05. Effect size was assessed using Cramer’s V statistic (ϕc). Trend data was analysed using log-linear regression models to assess estimated annual percentage change and 95th percentile confidence intervals (CI).

To complement the descriptive analysis, a mixed ecological study design was utilised to conduct retrospective analysis of pedestrian injuries in Victoria, Australia. The study design was utilised to assess differences in crash rates amongst various sub-groups of pedestrians and conduct time trend analysis to compare the changes in incident rates between 2009 and 2014/16. These years were selected as they correspond with two most recent iterations of the VISTA. The analysis focused on aggregate measures within each sub-group, allowing for linkage and comparison between the datasets utilised for incidence and exposure measures.

Injury incidence rates (IR) were calculated taking the frequency of cases of pedestrian from the VPARS data as the numerator and exposure measures of population, distance travelled, and number of trips from the household travel survey as the denominator. Incidence rates were compared for the most recent injury and household travel survey data across demographic variables (age, gender and metropolitan region), to identify subgroups with increased levels of risk.

Comparisons were also made between the two time periods to identify any changes in relative pedestrian injury risk over the five year time period between surveys. Where relative risk represents the incidents rates of an injury occurring in one group versus the incident rate of injury occurring in another group. Analyses were undertaken at a level of significance (α) of 0.05. Results are presented as incident rate ratios with 95th percentile confidence intervals (CI). Statistical analysis was undertaken using STATA 13 (StataCorp 2013) and IBM SPSS Statistics Version 25.

3.3 Results

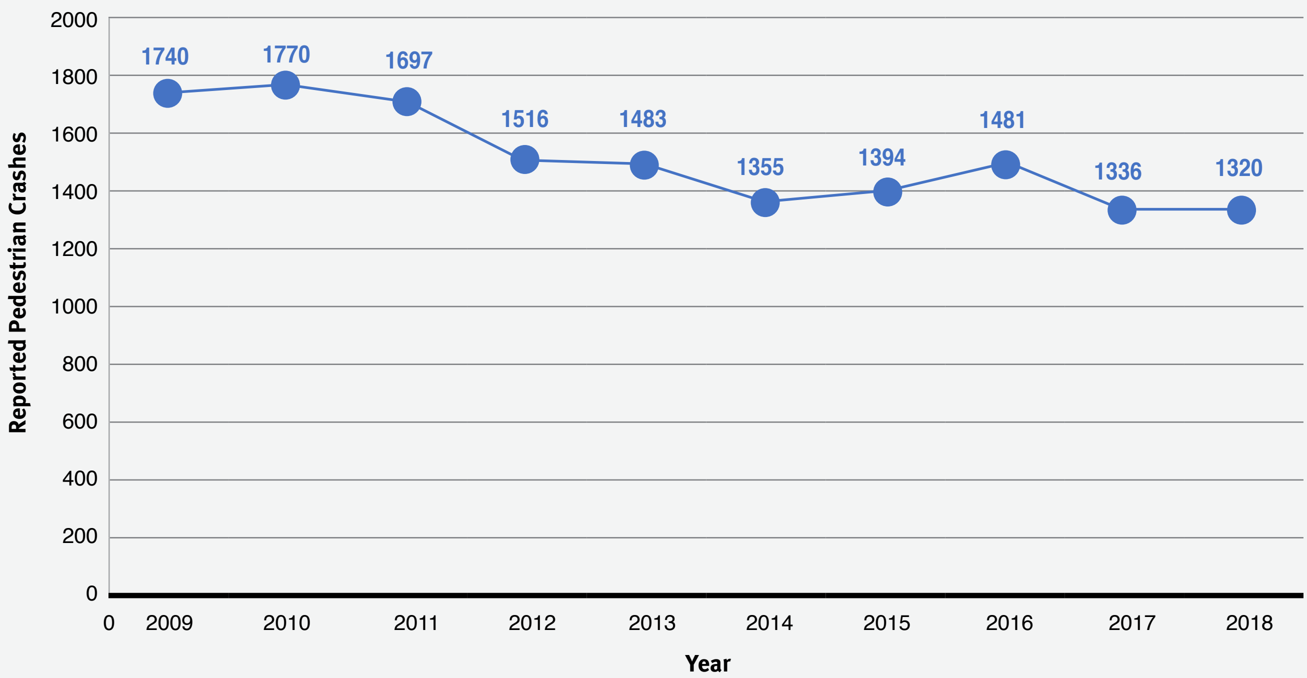
Results from the crash and injury datasets are presented separately in sections 4.1 to 6.1, travel behaviour and exposure measures are summarised in section 7.1, with the analysis of incident rates presented in section 7.2.

4 Police Data analysis

4.1 Overall Results

Between 2009 and 2018 a total of 15,092 injuries to a pedestrian, resulting from a crash, were reported to police and recorded in the Victoria Police Accident Records System (VPARS) dataset. Over the study period the number of crashes involving a pedestrian that were reported to police was found to have significantly decreased by 3.3 percent per annum (CI -3.9% to -2.8%) from 1,740 reported crashes in 2009 to 1,320 reported crashes in 2018 (Figure 1). However, it is noted that the reduction in reported crashes has remained reasonably constant over the past 5 years.

Figure 1: Reported pedestrian crashes (VPARS 2009-2018)



A summary of injured pedestrian demographics is presented in Table 1. Males were over-represented in the crash statistics, representing 51.3 percent of reported cases. Young adults were the most prevalent age group, representing 40.7 percent of injured pedestrians. Furthermore young males (0-39 years of age) were found to be involved in significantly more cases (29.0%) compared to females in the same age range (23.8%) ($x^2_{(5)}$ = 89.4, p < 0.01, ϕc = 0.077). The data also indicates that adults aged 70 years and older are over-represented in police reported cases, representing 15 percent of all injury cases, while only representing 10.7 percent of the Victorian population (ABS 2016).

Police Data Analysis

The majority of crashes were reported within the Metropolitan Melbourne area (81.5%), albeit rural and regional Victoria were over-represented when considering population statistics. Children experienced higher rates of crash involvement in regional and rural areas compared to metropolitan Melbourne (14.8% vs 12.1%) as did older adults (70+) (18.3% vs 14.3%). Young adults (16-39) were more likely to be involved in a collision in a metropolitan area (42.4%) compared to regional or rural locations (34.9%) ($x^2_{(5)}$ = 74.1, $p < 0.01$, $\phi c = 0.071$). There were also gender differences when considering crash locations, with female pedestrians more likely to be involved in crashes in urban locations (48.4%), while the majority of crashes in rural areas involved males (55.1%) ($x^2_{(1)}$ = 20.2, $p < 0.01$, $\phi c = 0.035$).

Table 1: Demographic characteristics

Variables		Frequency (n)	Percent (%)
Gender	Male	7,736	51.3
	Female	7,177	47.6
	Unknown	179	1.2
Age Group	0-15yrs	1,873	12.4
	16-39yrs	6,137	40.7
	40-59yrs	3,172	21.0
	60-69yrs	1,468	9.7
	70+yrs	2,260	15.0
	Unknown	182	1.2
Geographic region (based on location of residence)	Melbourne Metropolitan Area	12,300	81.5
	Regional/Rural Victoria	2,561	17.0
	Unknown	231	1.5

Considering the crash details for police reported pedestrian injuries (Table 2), the majority of cases resulted in minor injuries (57.5%) to the pedestrian. However, there was a substantial proportion of collisions that were recorded as serious (39.9%) and required more substantial medical attention. The number of fatal injuries was relatively low. However, compared to the Cause of Death data reported in Section 3.3.3 there are fewer fatal cases in the police reported data. This could be due to the fact that Police-reported fatality data does not include pedestrian fatalities that occur 'off-road' (e.g., in car parks, driveways, private property), nor does it include intentional deaths. When comparing injury severity with age group, the highest rates of serious and fatal injuries involved pedestrians aged 60 years and older ($x^2_{(10)}$ = 515, $p < 0.01$, $\phi c = 0.176$) reflecting the increased vulnerability of older pedestrians.

Definition for Coding Accidents (DCA) codes were extracted for each reported case. The majority of pedestrian injuries occurred when the pedestrian was crossing the carriageway (56.0%). Other common collision types involved pedestrians emerging from between parked vehicles (5.5%) and injuries sustained in or on driveways (5.2%). A particularly concerning finding was that 15 percent of collisions were coded as Hit/Run, indicating that in these cases, the other road user (most often the driver of a vehicle) did not stay on site after the collision had occurred.

Table 2: Crash details

	Crash Details	Frequency (n)	Percent (%)
Injury level	Fatal	393	2.6
	Serious	6,021	39.9
	Other	8,678	57.5
Definition for Coding Accidents (DCA)	Nearside (100)	5,148	34.1
	Emerging (101)	827	5.5
	Far side (102)	3,306	21.9
	Playing, working, lying, standing on carriageway (103)	708	4.7
	Walking with traffic (104)	343	2.3
	Facing traffic (105)	163	1.1
	On median/ footpath (106)	420	2.8
	Driveway (107)	784	5.2
	Struck while boarding or alighting a vehicle (108)	409	2.7
	Other pedestrian (109)	1,834	12.2
	Other	1,150	7.6
Hit/Run	Yes	2,268	15.0
	No	12,642	83.8
	Unknown	182	1.2

4.2 Vehicle and Driver Characteristics

Analysis of the counterpart involved in the pedestrian injury identified that most frequently collisions involved cars including station wagons, utility vehicles and panel vans, representing almost three quarters of collision counterparts (73.4%) (Table 3). Apart from taxis, the remaining vehicle types each represented less than 2 percent of collision counterparts. However, it was notable that the counterpart was unknown in 15.5 percent of cases.

Not surprisingly the majority of pedestrian crashes resulted in no damage (44.5%) or only minor damage (23.9%) to the vehicle involved in the collision. Analysis of vehicle movement, as reported by the police, indicated that the majority of collision involved a vehicle travelling straight ahead (43.5%), followed by left (8.5%) and right turning vehicle movements (15.7%).

Table 3: Counterpart characteristics

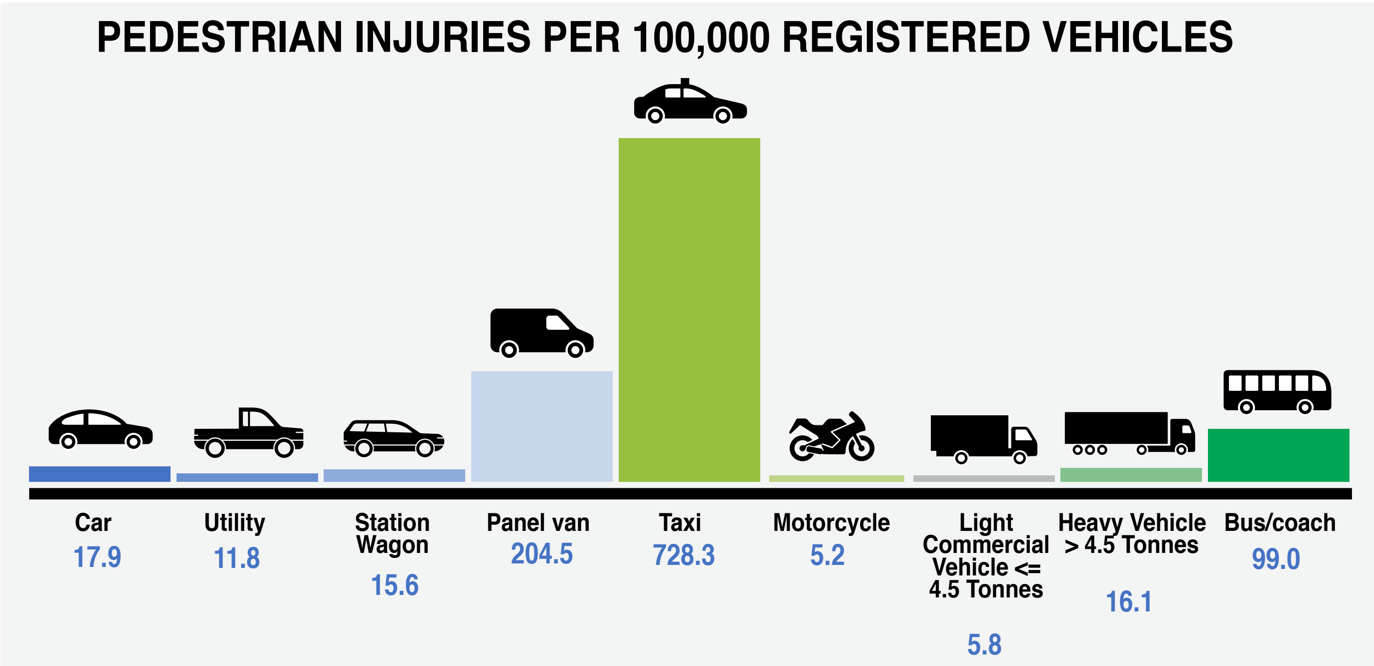
	Counterpart Characteristics	Frequency (n)	Percent (%)
Vehicle type	Car	7,365	48.8
	Utility	945	6.3
	Station wagon	2,353	15.6
	Panel van	378	2.5
	Taxi	511	3.4
	Motorcycle	170	1.1
	Motor scooter/moped	22	0.1
	Bicycle	150	1.0
	Light Commercial Vehicle (Rigid) <= 4.5 Tonnes	138	0.9
	Heavy Vehicle (Rigid) > 4.5 Tonnes	204	1.4
	Train	7	0.0
	Tram	208	1.4
	Bus/coach	222	1.5
	Other	74	0.5
	Unknown	2,345	15.5
Level of damage	Minor	3,604	23.9
	Moderate - Driveable Vehicle	777	5.1
	Moderate - Unit Towed Away	466	3.1
	Major - Unit Towed Away	114	0.8
	Extensive - Unrepairable	57	0.4
	Nil Damage	6,713	44.5
	Not Known	1,995	13.2
	Not reported	1,366	9.1
Vehicle movement	Going Straight Ahead	6,563	43.5
	Turn Right	2,364	15.7
	Turn Left	1,276	8.5
	Leaving a Driveway	316	2.1
	Reversing	1,012	6.7
	Parking - into / Out	338	2.2
	Other	671	4.4
	Not Known	1,184	7.8
	Not reported	1,368	9.1

Police Data Analysis

To assess the risk posed to pedestrians by different vehicle types, comparisons were made between the vehicle classifications provided in the VPARS dataset (Table 3) and the number of registered vehicles by each vehicle classification type in Victoria. Table 4 provides a summary of the registered vehicles. Using the collision counterparts as a measure of incidence and registered vehicles as a measure of exposure, it can be seen that per 100,000 registered vehicles taxis were disproportionately involved in pedestrian crashes. Similarly, there were high rates of crashes involving mopeds and scooters and buses compared to the proportion of registered vehicles. The relative risk of crashes with bicycles cannot be assessed using this method, as they are not registered vehicles.

Table 4: Pedestrian collision counterpart vs registerations 2009 -2018

Vehicle type	Register Vehicles	Counterparts/ 100,000 registered vehicles
Car	41,042,383	17.9
Utility	8,002,233	11.8
Station wagon	15,101,506	15.6
Panel van	184,851	204.5
Taxi	70,160	728.3
Motorcycle	3,253,166	5.2
Motor scooter/moped	14,220	154.7
Light Commercial Vehicle (Rigid) <= 4.5 Tonnes	2,397,021	5.8
Heavy Vehicle (Rigid) > 4.5 Tonnes	1,269,740	16.1
Bus/coach	224,331	99.0



Police Data Analysis

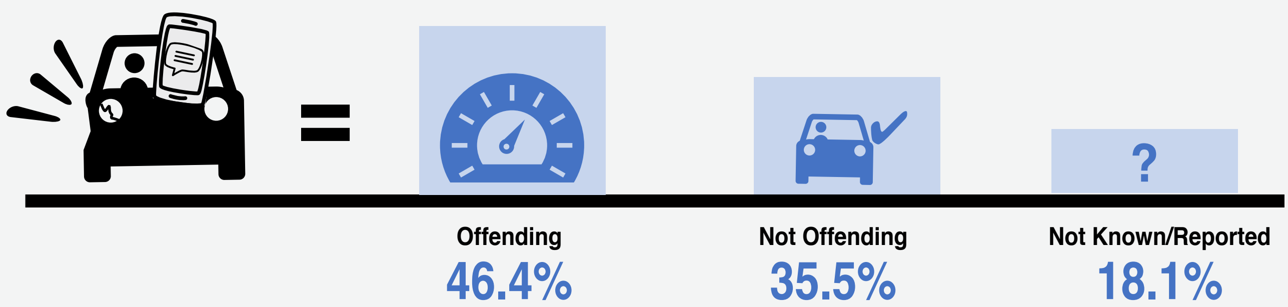
Analysis of demographic characteristics of the vehicle operator indicated a relatively even split between male (51.3%) and female (47.6%) drivers (Table 5). Police reported the driver involved in the collision as offending in 46.4 percent of collisions, while 35.5 percent were not considered as offending and for 18.1 percent this was not known or reported.

Considering the possible contributing factors reported by police, preliminary breath testing indicated that 1.1 percent of vehicle operators recorded a positive Blood Alcohol Concentration (BAC) reading. Mobile phone use by the vehicle operator was identified in 50 cases over the study period, however it was unknown in 40.8 percent of cases.

Table 5: Vehicle operator characteristics

Demographics		Frequency (n)	Percent (%)
Gender	Female	7,177	47.6
	Male	7,736	51.3
	Unknown	179	1.2
Offending	Yes	7,007	46.4
	No	5,351	35.5
	Not known	1,369	9.1
	Not reported	1,362	9 .0
Preliminary Breath Test	Negative	9366	62.1
	Positive	160	1.1
	Not reported	5566	36.9
Mobile Phone	Yes	50	0.3
	No	7,264	48.1
	Not known	6,162	40.8
	Not reported	1,616	10.7

DRIVER OFFENDING IN PEDESTRIAN CRASHES

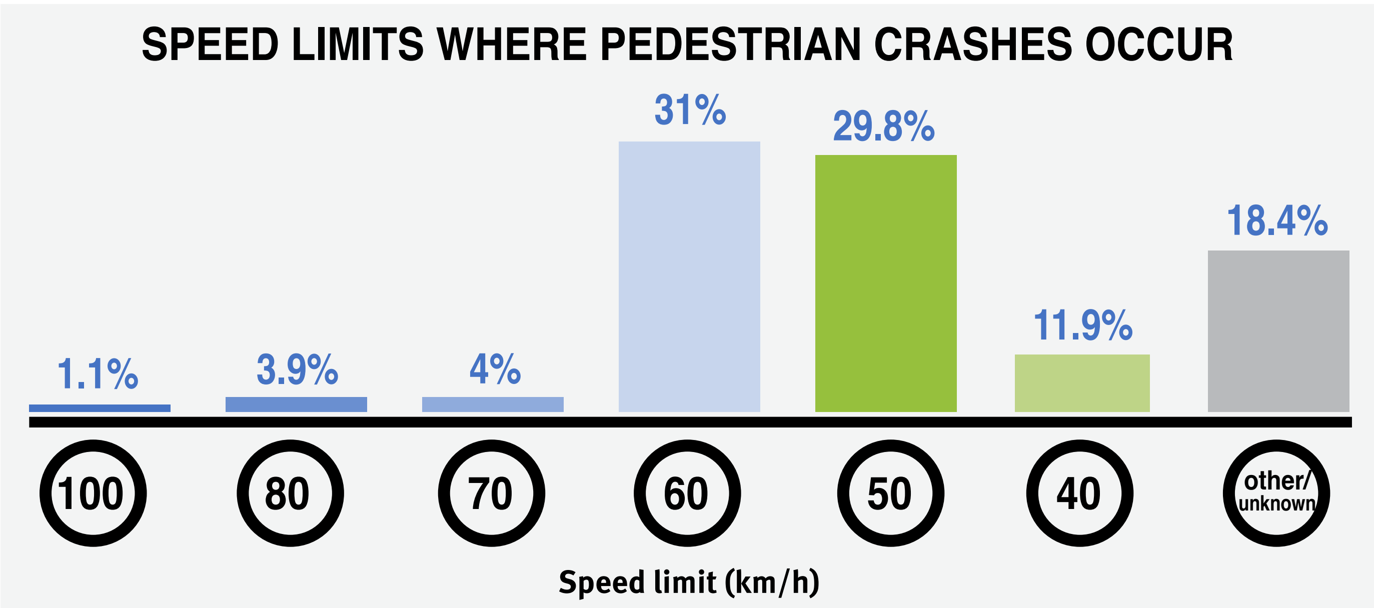


4.3 Road Environment and Spatial Analysis

Road environment conditions were analysed. Regarding collision location, there was a roughly even split between collisions at and away from intersections (Table 6). The majority of pedestrian crashes were found to occur on roads with posted speed limits of 60 km/h or less (75.3%). Furthermore, there was a significant relationship between speed environment and injury severity with fatal and serious injuries significantly more likely on roads with speed limits of 80 km/h or above ($x^2_{(2)} = 331$, $p < 0.01$, $\phi c = 0.160$), confirming the increased risk of serious injury for pedestrians in higher speed environments. It is noted that the data did not provide an indication of vehicle travel speed on impact.

Table 6 Road environment details

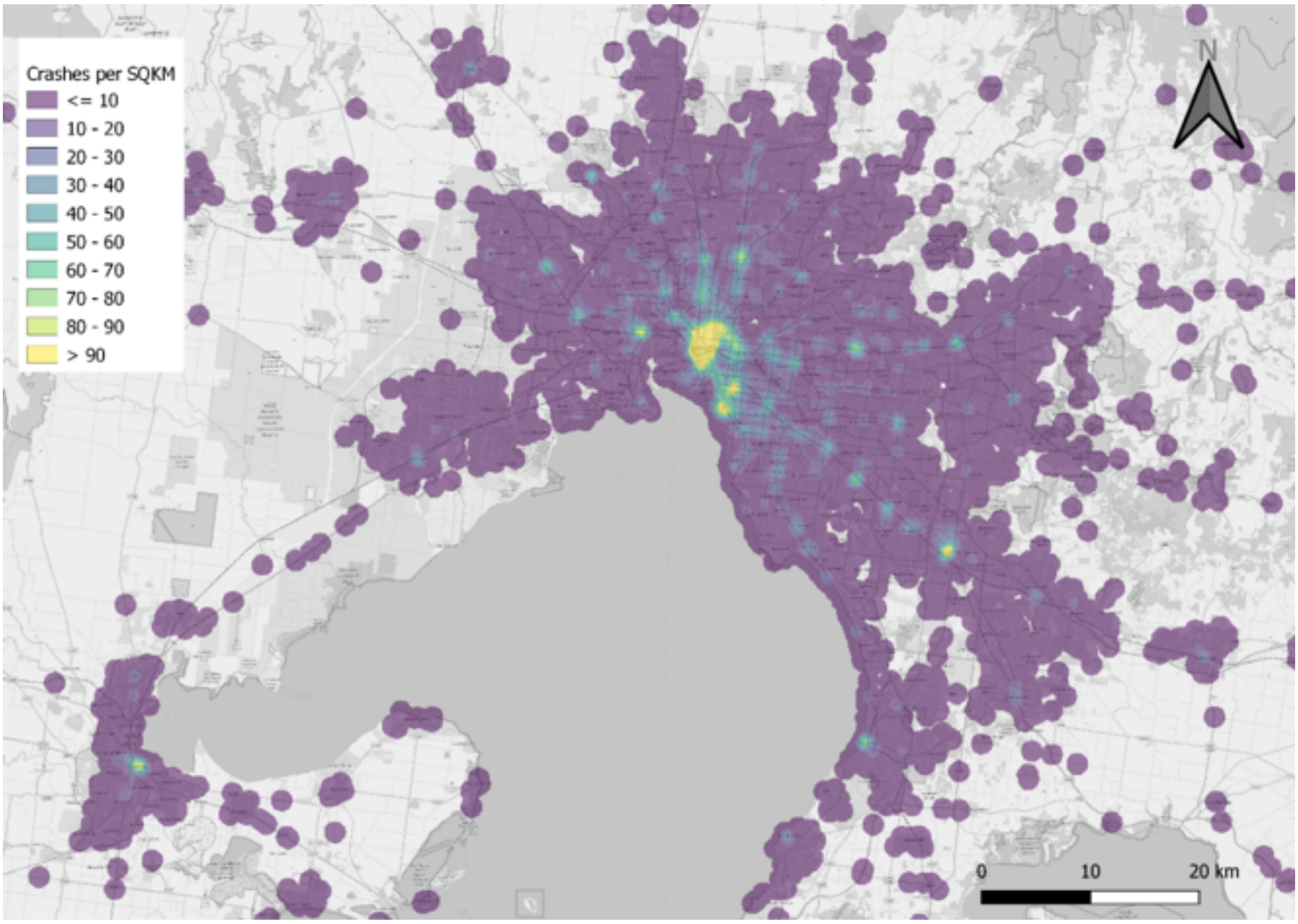
Variables		Frequency (n)	Percent (%)
Speed limit (km/h)	110	13	0.1
	100	159	1.1
	90	11	0.1
	80	585	3.9
	70	611	4.0
	60	4,677	31.0
	50	4,500	29.8
	40	1,798	11.9
	30	104	0.7
	Other	2634	17.5
Road infrastructure	Intersection	7,373	48.9
	Non-intersection	7,656	50.7
	Unknown	62	0.4



Police Data Analysis

Spatial analysis of collisions involving injured pedestrians over the study period indicate a number of locations with high collision rates Figure 2. The highest concentration of crashes occurred in the Melbourne CBD with the cluster extending from Southbank to Carlton. Other sizeable clusters in the inner city area included St Kilda, Prahran and Footscray. Outside of the inner city, clusters of crashes were also identified in Preston, Dandenong, Frankston, Geelong and Werribee. In addition, analyses revealed that there were also less prominent clusters at many major intersections, particularly along major arterial corridors, and in the vicinity of railway stations. This is likely a reflection of the increased pedestrian activity at these locations.

Figure 2: Pedestrian crash density (2009 – 2018)



When considering the spatial distribution of collisions by Local Government Area (Table 7), the highest proportion of injuries were identified in the City of Melbourne (10.9%), followed by Moreland City Council and the City of Boroondara. Interestingly, the number of collisions were lower in the City of Port Phillip and the City of Stonnington, which was somewhat unexpected given the clusters in St Kilda and Prahran. Outside of Metropolitan Melbourne, the LGAs with the highest proportion of collisions included Geelong, Ballarat, Bendigo, Latrobe and Shepparton.

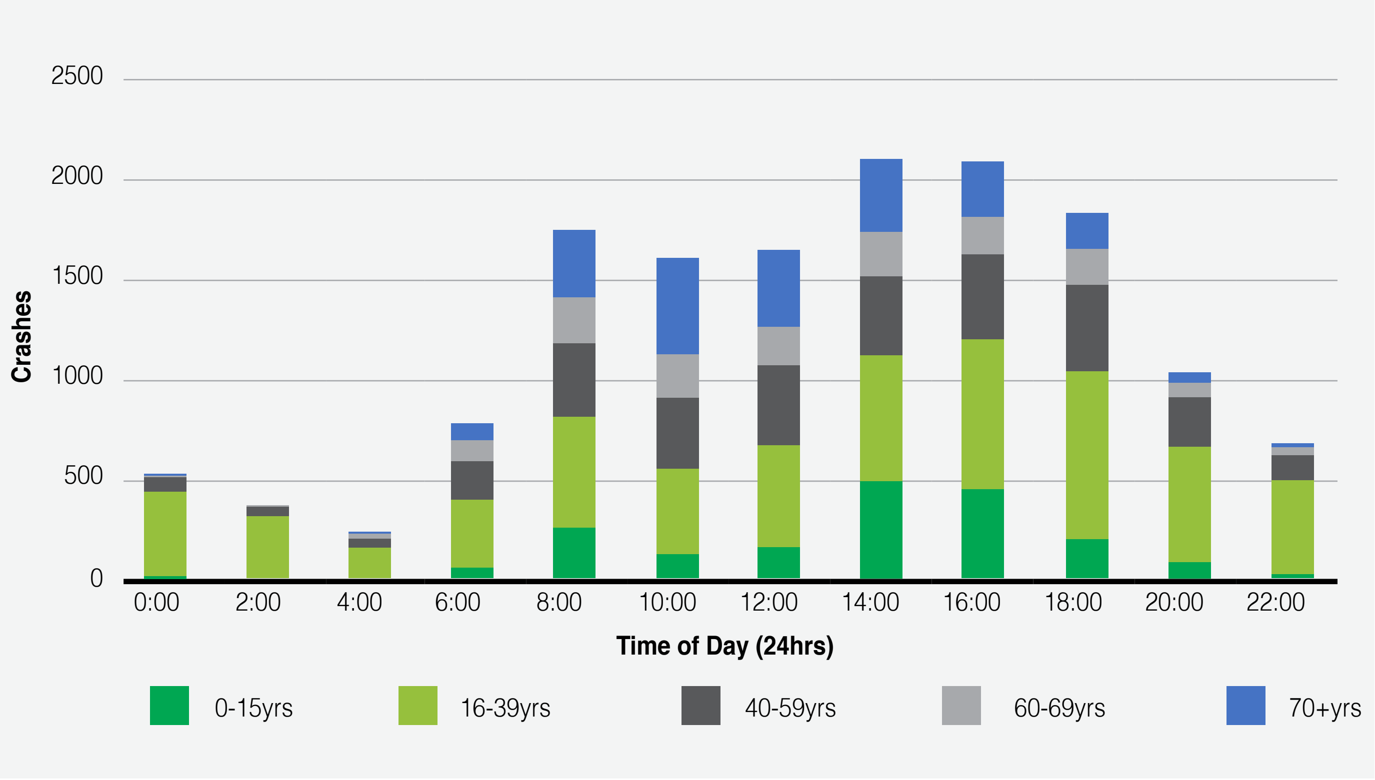
Police Data Analysis

Table 7: Local Government Areas with highest proportion of pedestrian crashes

Local Government Area		Frequency (n)	Percent (%)
Metropolitan Melbourne	Melbourne	1,639	10.9
	Moreland	626	4.1
	Boroondara	568	3.8
	Dandenong	556	3.7
	Yarra	555	3.7
	Darebin	528	3.5
	Stonnington	522	3.5
	Glen Eira	512	3.4
	Monash	501	3.3
	Port Phillip	482	3.2
Regional Victoria	Geelong	561	3.7
	Ballarat	238	1.6
	Bendigo	208	1.4
	Latrobe	154	1.0
	Shepparton	126	0.8

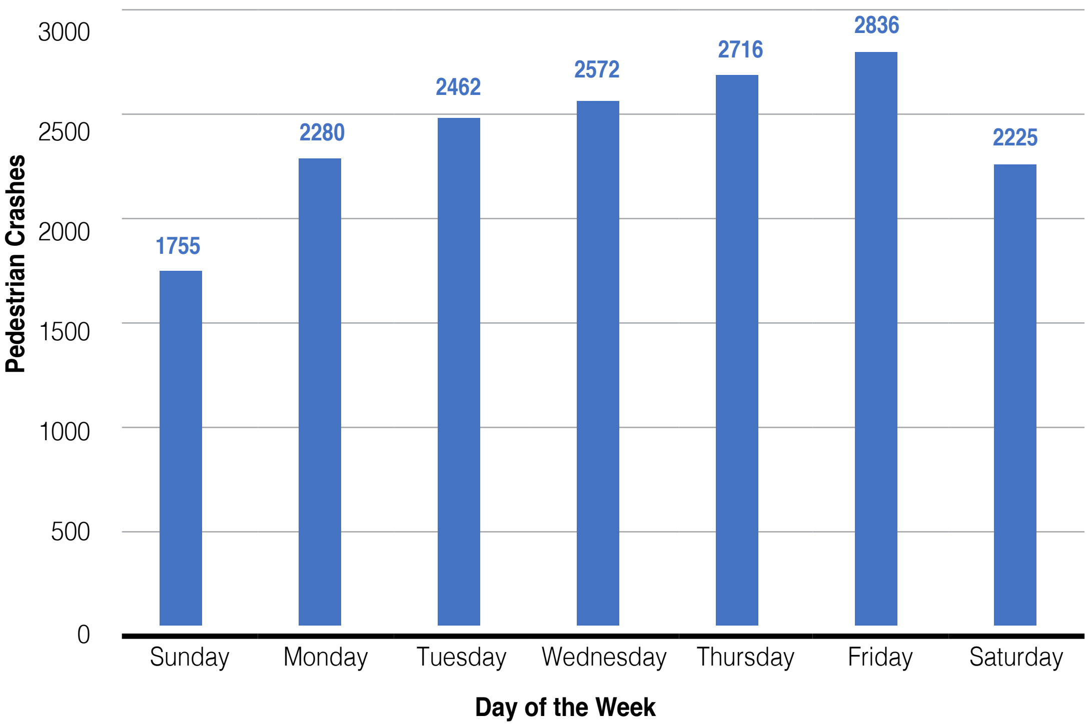
4.4 Timing of Crashes

Figure 3: Pedestrian reported crashes by Time of Day (2009-2018)



Within the VPARS dataset, temporal variables were examined for time of day, day or week and month of year of pedestrian injury collisions. The temporal distribution of injury collisions through the day are presented in Figure 3. When considering crashes involving pedestrians between 2009 and 2018, the highest proportion occurred in the afternoon, between 2:00pm and 3:59pm (14.4%), closely followed by the 4:00pm to 5:59pm time period (14.3%). There was also a noticeable peak between 8:00am and 9:59am, with 12.0 percent of collisions reported between these times. When considering gender differences, males were over-represented in collisions that occurred at night, most notably between 10:00pm and 5:59am ($x^2_{(11)} = 389$, $p < 0.01$, $\phi c = 0.164$). Furthermore, during this time period, the majority of injury collisions involved pedestrians aged between 16 and 39 years of age, which is likely a reflection of the increased exposure for this age group during these time periods. As expected, crashes involving older adults were more common during daylight hours, reflecting their prevalence during these time periods.

Figure 4: Pedestrian reported crashes by Day of Week (2009-2018)

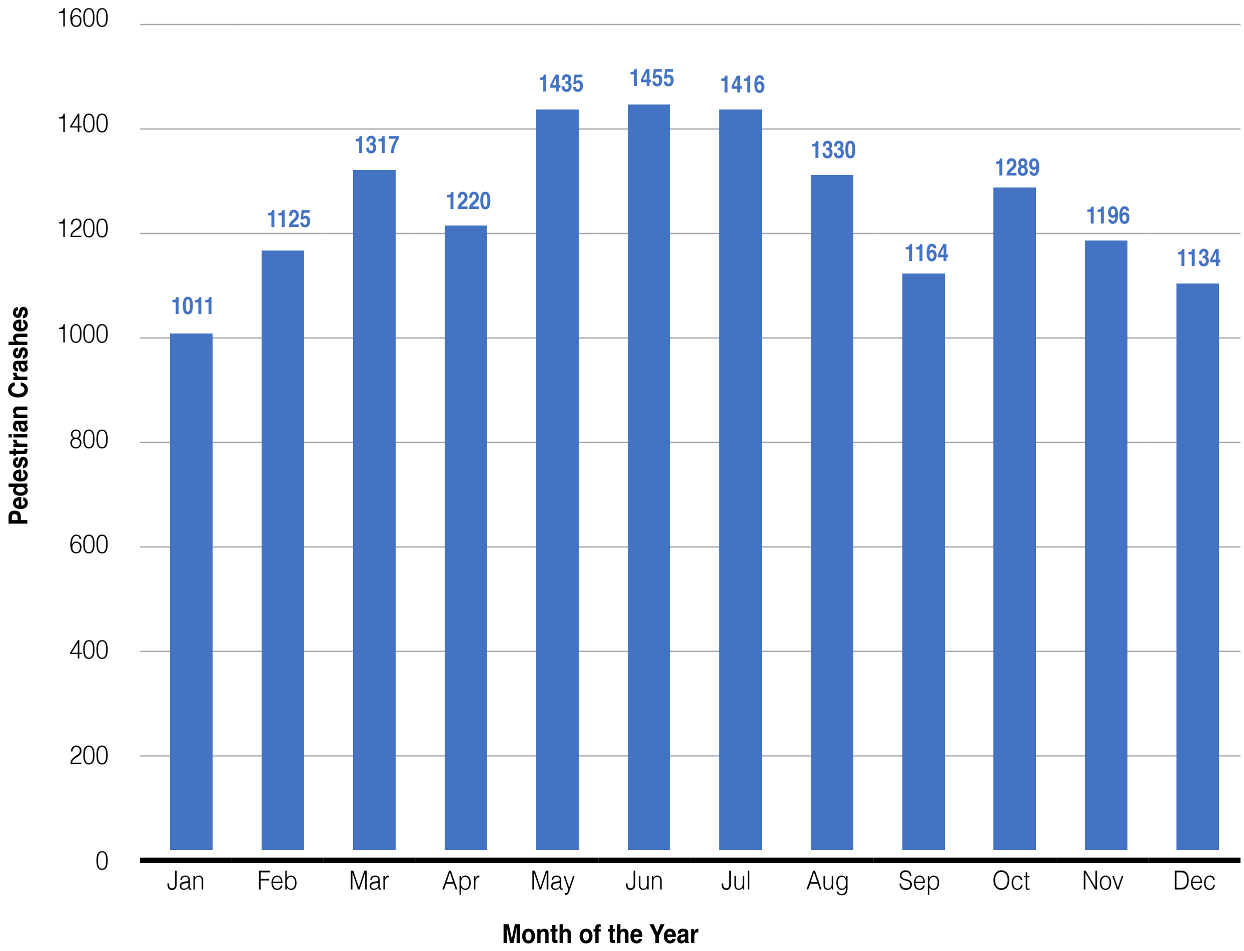


When considering the day of the week, the highest proportion of injury collisions occurred on Friday (17.1%). Again, there was a significant correlation between gender and day of the week, with males representing significantly more cases on Saturday and Sunday compared to females ($x^2_{(6)} = 56.5$, $p < 0.01$, $\phi c = 0.062$). Injury collisions on Saturday and Sunday were also more likely to involve adults aged between 16 and 39 years.

Police Data Analysis

When considering the month of the year, June had the highest number of reported pedestrian collisions, followed by May and July. Interestingly, when considering lighting conditions, June had the fewest crashes that occurred in daylight hours and the highest proportion occurring when it was dark. While this is somewhat expected given the winter solstice is in June, it may also indicate an increased risk for pedestrians when it is dark or in wet weather. Notwithstanding, the majority of pedestrian collisions occurred in clear weather conditions and during daylight hours (Table 8).

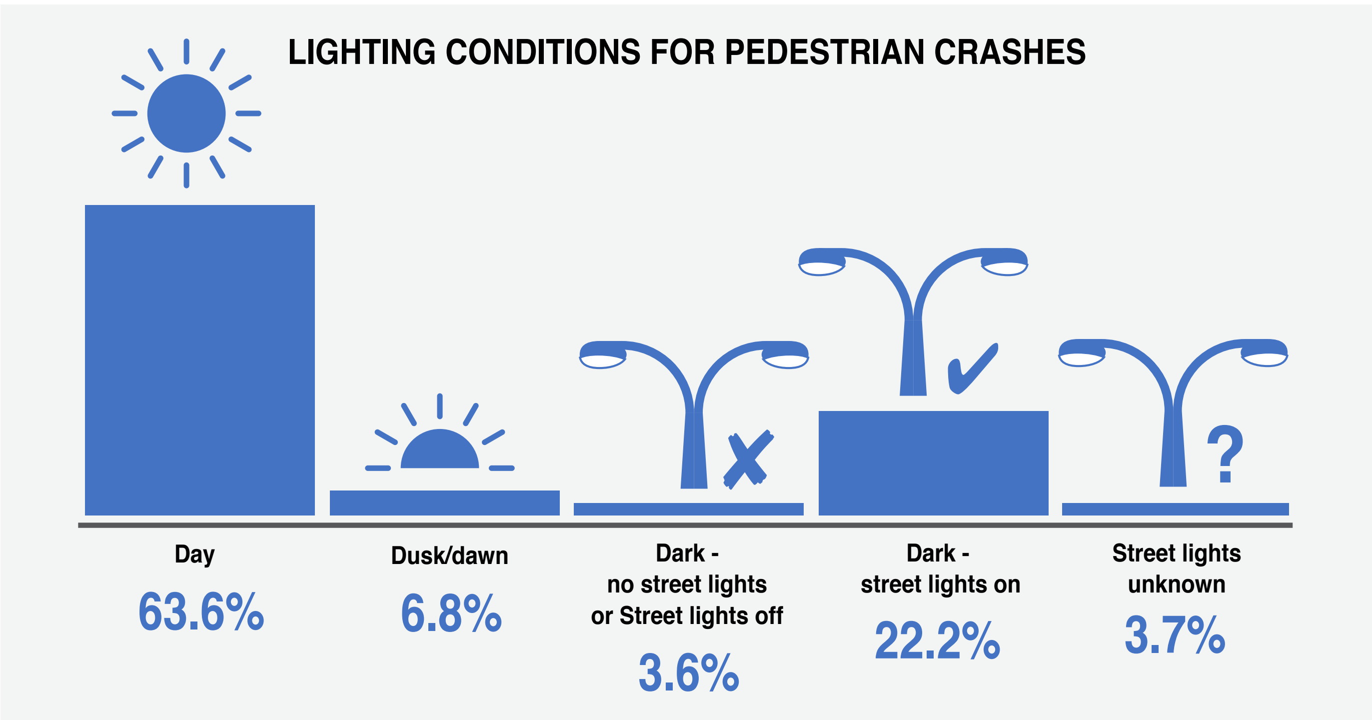
Figure 5: Pedestrian crashes by Month of Year (2009 – 2018)



Police Data Analysis

Table 8: Crash environmental conditions

Environmental condition		Frequency (n)	Percent (%)
Atmospheric	Clear	12,436	82.4
	Rain	1,398	9.3
	Fog	59	0.4
	Dust	11	0.1
	Strong wind	10	0.1
	Smoke	9	0.1
	Snow	3	0.0
	Unknown	1,166	7.7
Lighting	Day	9,601	63.6
	Dusk/dawn	1,032	6.8
	Dark - no street lights	490	3.2
	Dark - street lights on	3,353	22.2
	Dark - street lights off	53	0.4
	Dark - street lights unknown	276	1.8
	Unknown	287	1.9

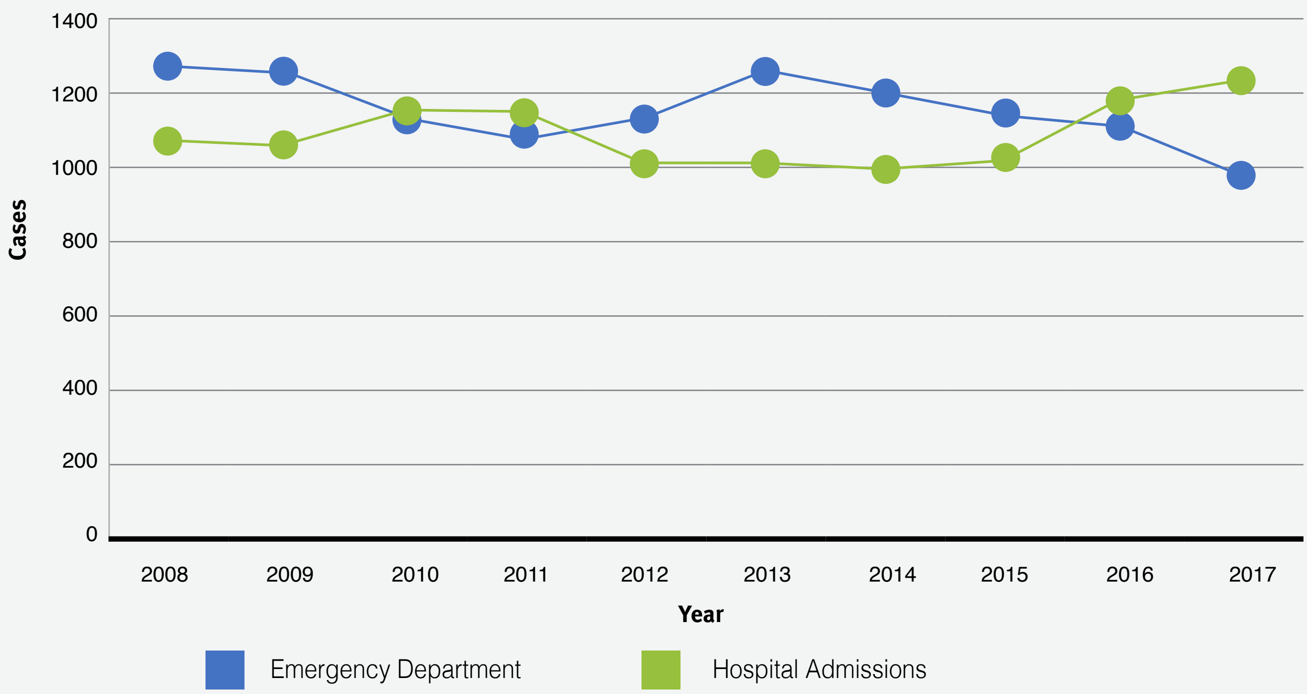


5 Hospital Data Analysis

5.1 Analysis of Injuries

Analysis of pedestrian injury data recorded in the Victoria Injury Surveillance dataset revealed that between 2008 and 2017 there were at least 10,845 hospital admissions and 11,590 emergency department presentations involving an injured pedestrian. Over the study period the number of emergency department presentations decreased by a statistically significant 1.54% per annum (CI = -2.20% to -0.91%). On average there was an increase in hospital admissions by 0.65 percent (-0.01 to 1.31%), however the change was not statistically significant (p = 0.053) (Figure 6).

Figure 6: VISU cases (2008-2017)



Analysis of demographics identified that males represented the majority of admissions (54.9%) and emergency department presentations (51.9%). Pedestrians in the 15-34 year age group represented the majority of admissions and presentations, followed by the 35 to 64 year age group (Table 9). However when adjusting for population, pedestrians aged 75 years and older had the highest rates of admissions and presentations. Across both datasets the majority of cases were recorded in the Melbourne Metropolitan Area (78.6% for hospital admissions and 75.7% for emergency department presentations).

Hospital Data Analysis

Table 9: VISU Demographic summary

Demographics		Admissions		Emergency Department Presentations	
		Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Gender	Male	5,952	54.9	6,010	51.9
	Female	4,893	45.1	5,580	48.1
Age Group	0-14yrs	1,135	10.5	1,526	13.2
	15-34yrs	3,485	32.1	4,367	37.7
	35-64yrs	3,328	30.7	3,542	30.6
	65-74yrs	1,108	10.2	920	7.9
	75-84yrs	1,180	10.9	844	7.3
	85+yrs	609	5.6	391	3.4

When considering the types of injuries sustained, the most commonly injured body region was the head, followed by injuries to the knee and lower leg and ankle and foot (Table 10). Across the two datasets, fractures were the most common type of injury representing 21.3 percent of cases to the ED and 44.5 percent of hospital admissions (Table 11). Superficial injuries (15.4%) and dislocations, sprains and strains (19.9%) were the next most common injuries resulting in emergency department presentations, while intracranial injuries (11.7%), followed by superficial injuries (11.5%) and open wounds (10.3%) were the most common injuries requiring hospital admission, reflecting the increased severity of the injuries requiring hospitalisation.

Table 10: Grouped body site injured

Grouped body site injured	Admissions		Emergency Department Presentations	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Head	2,938	27.1	1762	15.2
Knee & lower leg	2,385	22.0	1753	15.1
Abdomen, lower back, lumbar spine & pelvis	1,080	10.0	572	4.9
Ankle & foot	825	7.6	2191	18.9
Hip & thigh	779	7.2	623	5.4
Shoulder & upper arm	741	6.8	475	4.1
Thorax	658	6.1	293	2.5
Elbow & forearm	608	5.6	481	4.2
Wrist & hand	319	2.9	476	4.1
Neck	278	2.6	190	1.6
Multiple body regions	13	0.1	2336	20.2
Unspecified body region	66	0.6	352	3.0
Other	65	0.6	86	0.7
Missing injury code	90	0.8	-	-
Total	**10,845**	**100**	**11,590**	**100**

Hospital Data Analysis

Table 11: Grouped nature of main injury

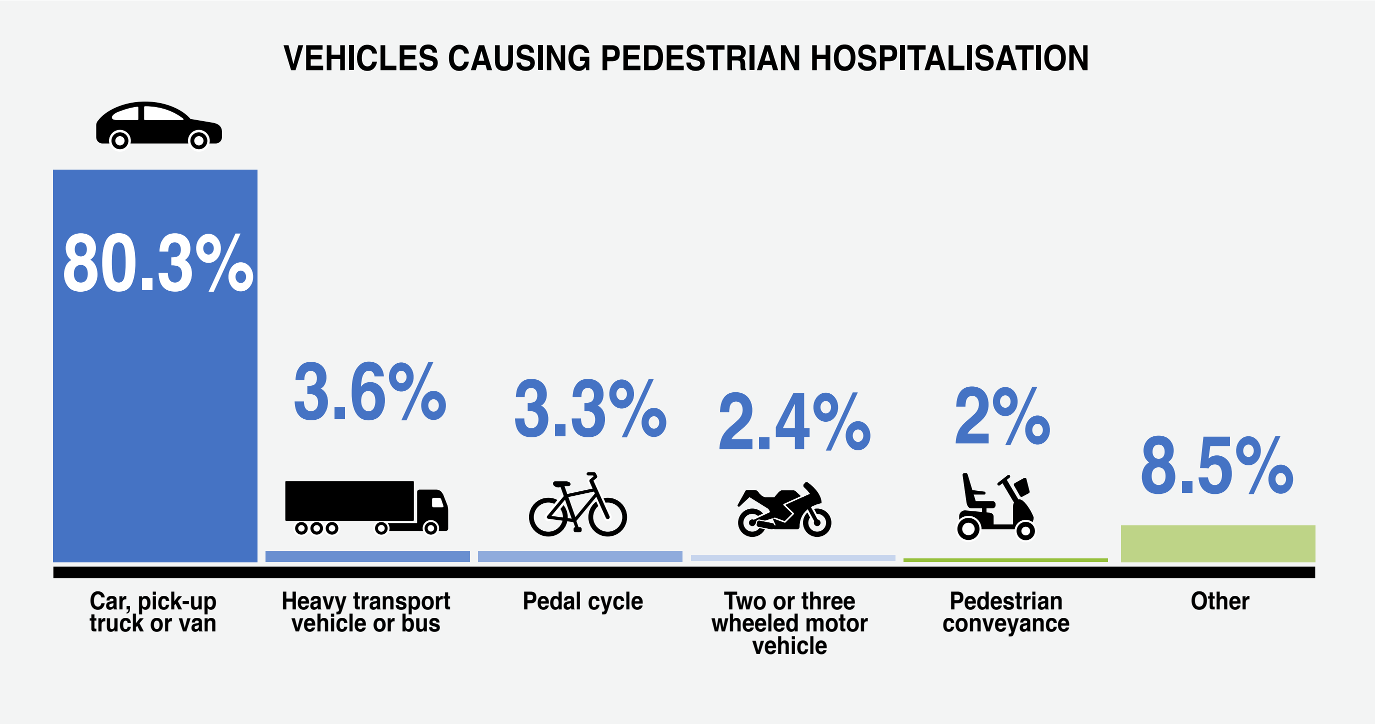
Grouped nature of main injury	Admissions		Emergency Department Presentations	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Fracture	4,823	44.5	2466	21.3
Intracranial injury	1,273	11.7	428	3.7
Superficial injury	1,245	11.5	1786	15.4
Open wound	1,117	10.3	799	6.9
Dislocation, sprain & strain	391	3.6	2302	19.9
Injury to internal organs	257	2.4	159	1.4
Injury to muscle & tendon	140	1.3	693	6.0
Crushing injury	58	0.5	275	2.4
Injury to nerves & spinal cord	39	0.4	17	0.1
Traumatic amputation	25	0.0	6	0.1
Injury to blood vessels	25	0.2	29	0.3
Eye injury- excluding foreign body	15	0.0	13	0.1
Other & unspecified injury/ missing	1,409	0.2	2617	22.6

Cases requiring hospitalisation were classified using ICD 10AM. Analysis of the cause code identified that the majority of hospital admissions were due to a pedestrian being injured in a collision with a car (80.3%), this was followed by collisions with heavy vehicles (3.6%) and unspecified cases (5.7%) (Table 12).

5.2 Vehicle Characteristics

Table 12: Hospitalisations by ICD 10AM cause code

ICD 10 AM Cause Code	Frequency (n)	Percent (%)
Pedestrian injured in collision with car, pick-up truck or van	8,704	80.3
Pedestrian injured in other and unspecified transport accidents	619	5.7
Pedestrian injured in collision with heavy transport vehicle or bus	388	3.6
Pedestrian injured in collision with pedal cycle	356	3.3
Pedestrian injured in collision with two- or three-wheeled motor vehicle	258	2.4
Pedestrian injured in collision with pedestrian conveyance (i.e. skateboard, wheelchair, mobility scooter etc.)	216	2.0
Pedestrian injured in collision with other non-motor vehicle	162	1.5
Pedestrian injured in collision with railway train or railway vehicle	142	1.3
Total	**10,845**	**100**

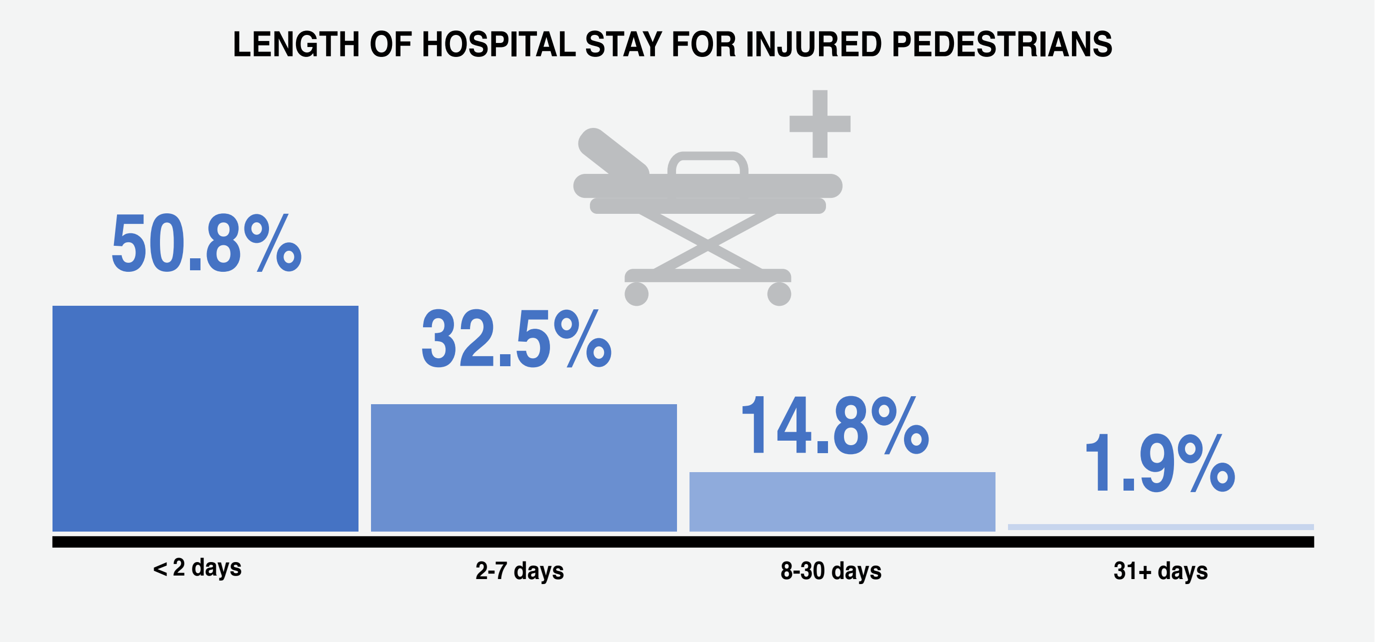


5.3 Length of Hospital Stay

Analysis of the length of hospital stay required by injured pedestrians identified that just over half of admissions were less than 2 days in duration (50.8%). However, there was a small proportion of cases that required extensive medical treatment, with 1.9 percent of cases requiring hospitalisation for over a month as a result of their injuries.

Table 13: Length of Hospital Stay

Length of Hospital Stay	Frequency (n)	Percent (%)
< 2 days	5511	50.8
2-7 days	3523	32.5
8-30 days	1603	14.8
31+ days	208	1.9
Total	**10,845**	**100.0**

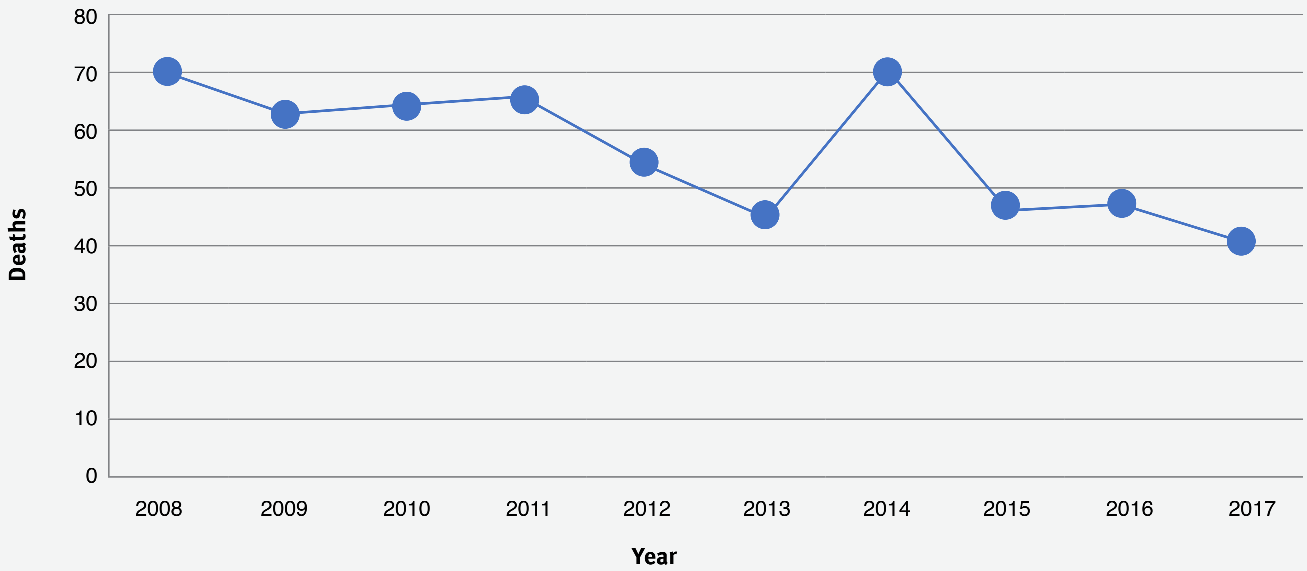


6 Fatality Data Analysis

6.1 National Cause of Death Unit Record File

Pedestrians deaths recorded in the National Cause of Death Unit Record File were extracted for the most recent 10 years of data. Limited information was available covering only age, gender and cause codes. Between 2008 and 2017 there was an average of 56.4 fatal pedestrian injuries recorded per annum in Victoria (Figure 7).

Figure 7: CODERF cases (2008-2017)



Males were over-represented amongst pedestrian fatalities, representing 66.0 percent of reported cases (Table 14). Further, middle aged adults (35-64yrs) represented the highest proportion of fatal injuries (30.1%), followed by adults in the 15 to 34 age range (20.7%). When controlling for population, there was a positive relationship between age and crash risk, with increasing fatal rates observed as pedestrians age increased.

Table 14: CODERF demographics (2008-2017)

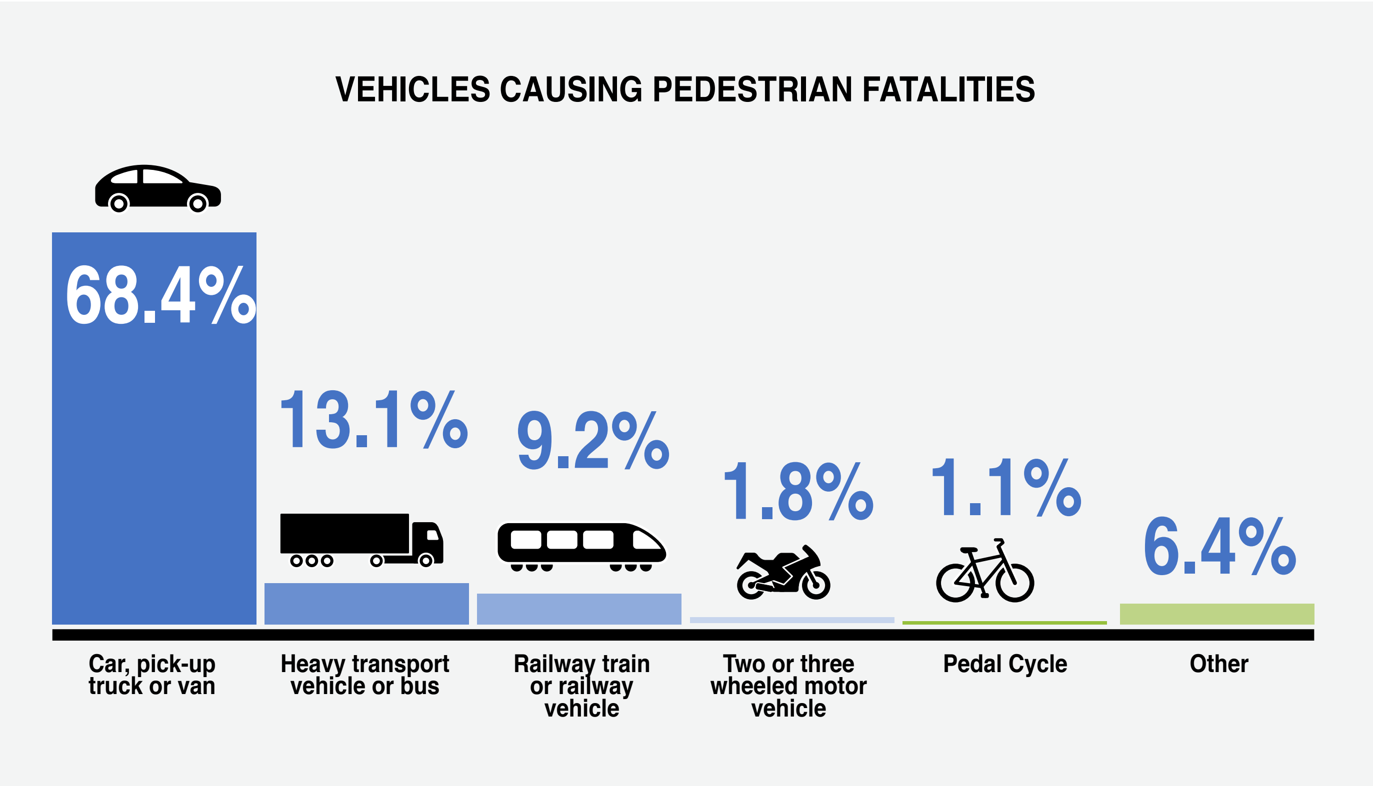
Demographics		Frequency (n)	Percent (%)
Gender	Male	372	66.0
	Female	192	34.0
Age Group	0-14yrs	43	7.6
	15-34yrs	117	20.7
	35-64yrs	170	30.1
	65-74yrs	66	11.7
	75-84yrs	95	16.8
	85+yrs	73	12.9
Total		**564**	**100.0**

Fatality Data Analysis

Summaries of ICD 10AM Cause Code attributed to each case identified that the majority of cases involved a pedestrian being injured due to a collision with a car (68.4%). This was followed by heavy transport vehicles or buses 13.1%). Heavy vehicles and buses were involved in fewer crashes overall, demonstrating the increased injury severity for pedestrians when a collision does occur (Table 15).

Table 15: CODERF ICD 10AM Cause Code (2008-2017)

ICD 10AM Cause Code	Frequency (n)	Percent (%)
Pedestrian injured in collision with car, pick-up truck or van	386	68.4
Pedestrian injured in collision with heavy transport vehicle or bus	74	13.1
Pedestrian injured in collision with railway train or railway vehicle	52	9.2
Pedestrian injured in other and unspecified transport accidents	30	5.3
Pedestrian injured in collision with two- or three-wheeled motor vehicle	10	1.8
Pedestrian injured in collision with other non-motor vehicle	6	1.1
Pedestrian injured in collision with pedal cycle	6	1.1
Total	**564**	**100.0**



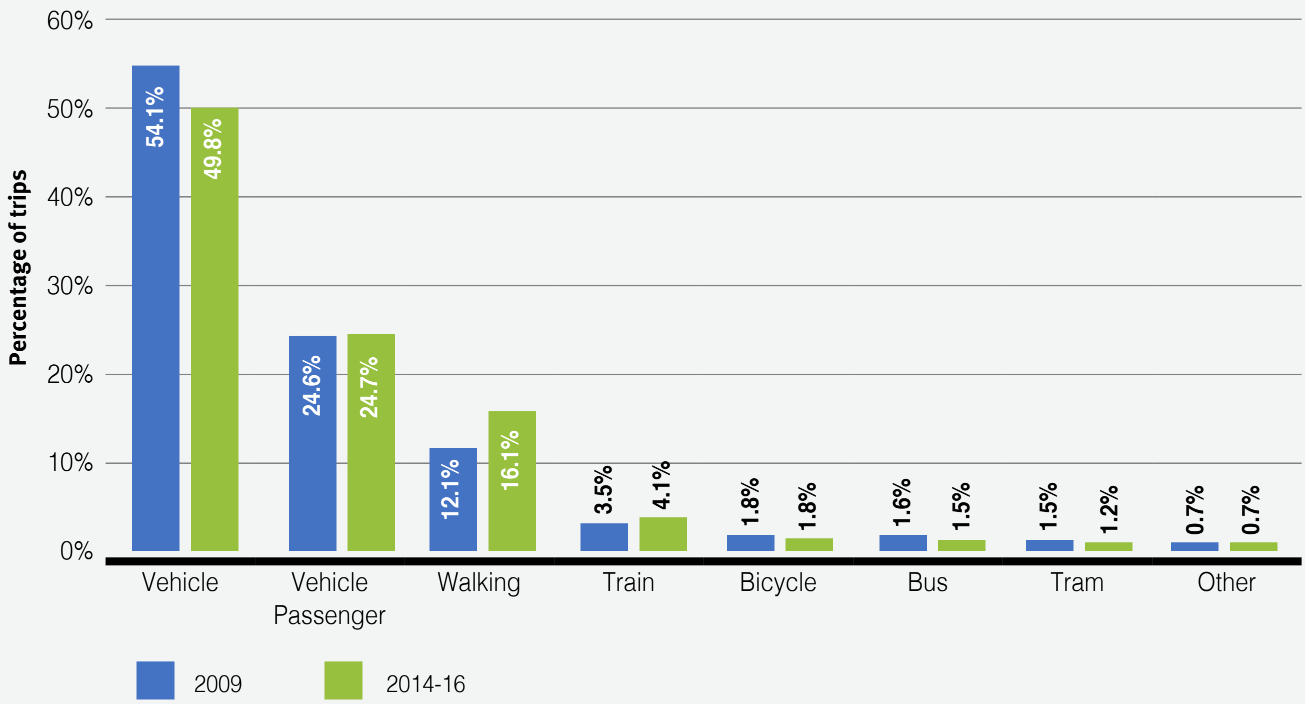
7 Pedestrian Exposure Analysis

7.1 Pedestrian Exposure

Exposure data was sourced from the VISTA household travel surveys. Analysis considered walking trips, duration and distance as measures of exposure. Based on data from the VISTA travel survey, it is estimated that the proportion of trips made by walking increased when comparing mode share from the 2009 and 2014/16 VISTA surveys (12.1% vs 16.3%) (Figure 8). It is noted that these are trips undertaken predominantly by walking. There are many more trips, particularly using public transport, that include a walking component, that were not captured in this analysis.

The most popular mode of transport was private motor vehicle, representing approximately 75 percent of trips in the 2014 to 2016 survey data.

Figure 8: VISTA Mode share by total trips



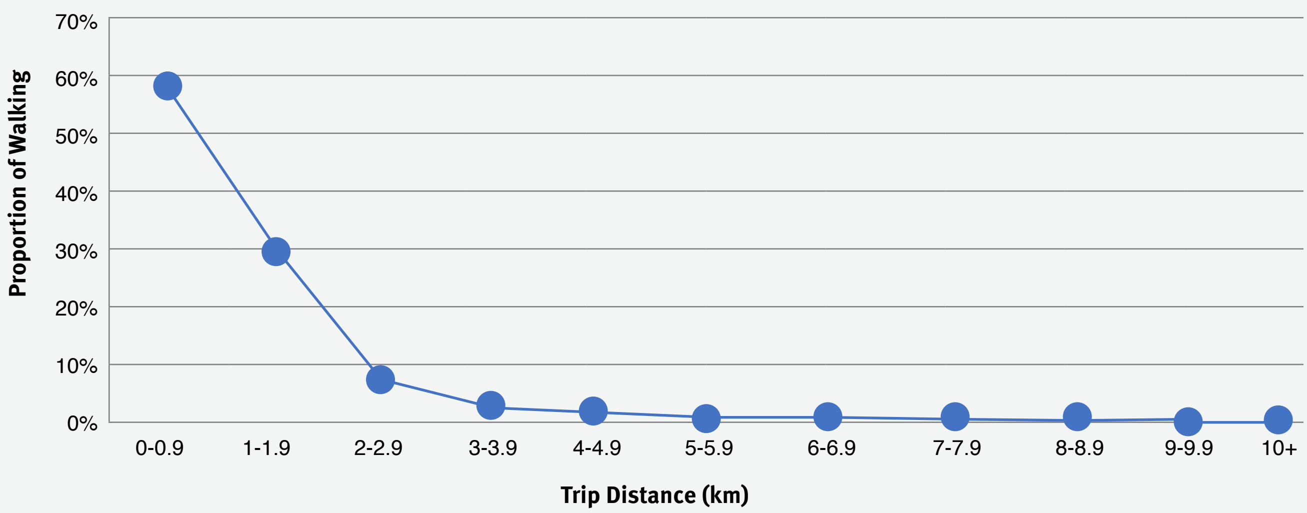
Pedestrian Exposure Analysis

Table 16: VISTA Walking Trips by Purpose

Trip Purpose	2014-2016	
	Frequency	Percent
Recreational	524,004	23.1
Personal Business	433,792	19.1
Social	356,116	15.7
Buy Something	340,580	15.0
Work Related	202,607	8.9
Education	174,202	7.7
Accompany Someone	113,519	5.0
Pick-up or Drop-off Someone	84,806	3.7
Pick-up or Deliver Something	32,702	1.4
Other Purpose	10,952	0.5

Analysis of walking trip purpose identified that walking trips were most commonly recreational (23%), followed by trips to undertake personal business and for social purposes (Table 16).

Figure 9: VISTA 2014-16 Walking trips by distance



Pedestrian Exposure Analysis

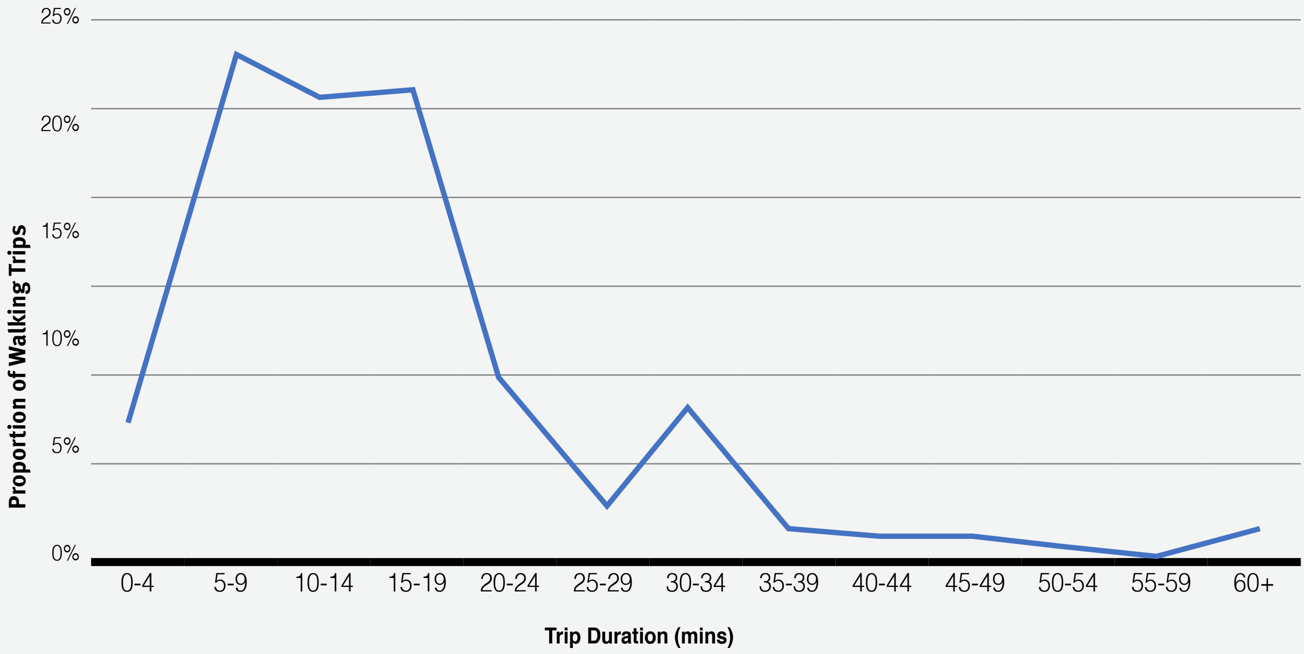
The majority of walking trips were less than two kilometres (88%) (Figure 10). However, analysis of walking trip duration (Figure 10) identified that there is a greater variance with the majority of walking trips (65%) lasting between 5 and 19 minutes.

The age and gender characteristics of those undertaking walking trips is shown in Table 17. The data indicates that females tend to make a higher number of walking trips compared to males, while the majority of trips were made by younger adults between the age of 16 and 39 years.

Table 17: Walking trip demographics (2014-2016)

Demographics		Frequency (n)	Percent (%)
Gender	**Males**	1,015,220	45.3
	Females	1,223,532	54.7
Age Group	**0-15yrs**	406,548	19.4
	16-39yrs	815,885	38.9
	40-59yrs	602,440	28.7
	60-69yrs	244,787	11.7
	70+yrs	169,093	8.1

Figure 10: VISTA 2014-16 Walking trips by duration



7.2 Incidence Rate Ratios

Incidence rates were calculated for combinations of exposure, measured using the VISTA travel surveys, and incidence, measured for the same time period using the police reported VPARS data. When considering incident and exposure corresponding with the most recent VISTA travel survey between 2014 and 2016.

Adjusting for population, male pedestrians had a higher relative risk (5%) of crash involvement compared to females, however the difference was not statistically significant (RR = 1.05 p = 0.18, CI [0.95, 1.17]). However, when considering number of trips (RR = 1.20 p = 0.00, CI [1.08, 1.34]) and distance (RR = 1.14 p = 0.00, CI [1.03, 1.27]) males were found to have a significantly higher risk of injury compared with females, 20% and 14% respectively.

When considering age groups, compared to pedestrians aged between 16 and 39 years, children (0 to 15yrs) had roughly half the risk of crash involvement when controlling for population (RR = 0.52 p = 0.00, CI [0.43, 0.63]), likewise adults aged 40 to 59 years (RR = 0.74 p = 0.00, CI [0.65, 0.86]) and 60 to 69 years (RR = 0.91 p = 0.16, CI [0.75, 1.1]) had lower relative risks of injury, however the difference was not statistically significant for the 60 to 69 year age group. Adults aged 70 years and older were increasingly likely to be injured as a pedestrian (RR = 1.6 p = 0.00, CI [1.37, 1.86]) when considering population, with the relative risk of injury similar for each population group when considering distance travelled and number of trips.

Time trend analysis between 2009 and 2014-16 indicated that the relative risk of injury decreased when considering population, number of trips and trip distance as exposure measures. This finding suggests that the risk of pedestrian injury at a population level is reducing across gender and age group. While reductions were identified for all age and gender combinations, it is noted that the lowest rates of reduction were observed for older pedestrians, when considering population as an exposure measure.

Table 18: Time trend analysis (Relative Risk [95% Confidence Interval])

Variables		Population VPARS	Trips VPARS	Distance VPARS
Gender	**Males**	0.72 [0.67, 0.77]	0.58 [0.61, 0.70]	0.48 [0.50, 0.58]
	Females	0.71 [0.64, 0.78]	0.57 [0.58, 0.70]	0.47 [0.48, 0.58]
Age Group	**0-15yrs**	0.73 [0.66, 0.81]	0.60 [0.60, 0.74]	0.49 [0.49, 0.60]
	16-39yrs	0.63 [0.52, 0.77]	0.66 [0.65, 0.97]	0.56 [0.56, 0.83]
	40-59yrs	0.65 [0.58, 0.73]	0.52 [0.56, 0.70]	0.42 [0.45, 0.55]
	60-69yrs	0.81 [0.69, 0.95]	0.52 [0.46, 0.63]	0.43 [0.37, 0.51]
	70+yrs	0.78 [0.61, 0.99]	0.65 [0.51, 0.83]	0.58 [0.46, 0.74]

8 Discussion

Pedestrians are one of the most vulnerable road user groups and the findings of this study highlight that significant numbers of pedestrian injuries occur within the road environment every year in Victoria. This demonstrates that substantial efforts are still needed to meet the Victorian Road Safety Strategies aspirational goals of Towards Zero 2016/2020 (Victorian Government) and new targets of Zero2050 (Strandroth et al. 2019).

Pedestrians involved in collisions are associated with a wide range of trauma, from minor injuries that are only reported to police, through to emergency department presentations, hospital admissions and a relatively small but substantial number of cases that result in death. One promising finding of this research is the reductions in Police-reported collisions and emergency department presentations over the ten-year study period. Furthermore, the number of hospital admissions remained relatively constant during this time, despite an overall increase in population across the state, indicating a per capita reduction in pedestrian trauma. However, road fatality data for 2019 indicates an increase in pedestrian trauma compared to 2018[1].

Concurrently, there has been an increase in the rate of walking trips being made across Victoria as evidenced through the findings of the Victorian Integrated Survey and Travel and Activity (VISTA) database. Combined, this has shown a reduction in the relative injury risk of walking at a population level. These are generally positive findings and with the benefits of increased walking well established (Badawi 2018), our findings highlight that, concurrent with promotion of active travel, there is a need for continued investment and improvements in the provision of safe walking environments to reduce the risk of injury.

While overall there has been a reduction in pedestrian trauma in Australia and other high income countries, as identified in the previous academic literature (Section 2), there are subgroups of pedestrians who remain at higher risk compared to the general population. The analysis in this report identified that older pedestrians, aged 70 years and older have the greatest risk of injury, roughly 1.6 times higher than young adults (16 to 39 years). This is consistent with previous research investigating pedestrian trauma in Victoria including O'Hern et al. (2015) and Senserrick et al. (2014), and consistent with international findings.

Older pedestrians are at increased risk for two general reasons: primarily, increased physical frailty and susceptibility to injury; and also a range of age related sensory, cognitive and physical impairments that might increase the risk of a crash, with even healthy adults experiencing some degree of decline throughout the ageing process (OECD 2001, Anstey et al. 2015). While the findings highlight that the relative risk for older adults has decreased, the risk has not reduced to the same extent as other age groups. It is also noted that Australia has an ageing population. Australians aged 70 years and older comprise a growing proportion of the total population, and this is projected to grow steadily over the coming decades (Australian Institute of Health & Welfare, 2018). In addition, it is noted that the profile of the older population is projected to change. In 2017, more than half of older people (57%, or 2.2 million) were aged 65-74 years, one-third were aged 75-84 years (30%, or 1.2 million), and 13 percent were aged 85 years and over. By 2047, it is projected that 65-74 year olds will comprise 45 percent of the older population, 75-84 year olds 35 percent, and 85+ year olds 20 percent. Furthermore, older Australians are living longer and in better health than ever before, and will have higher expectations for maintaining personal mobility (O'Hern et al. 2015). As such, more efforts need to be targeted towards improving walkability for older adults while reducing the disproportionate road trauma older pedestrians experience.

The other subgroup of high injury risk pedestrians identified in this study were young adults, particularly males. Injuries to young adults were particularly common at night and on weekends. Previous research has identified these as high alcohol times (Corben & Duarte, 2000) and identified that males are typically over-represented in alcohol-related pedestrian injuries. Alcohol slows brain function, reduces judgement and increases risk taking behaviours. It can also affect sense of balance making pedestrians unsteady on their feet and less capable of performing tasks such as crossing the road. There is evidence that high BAC levels are associated with increased risk of injury, and associated with poorer road crossing decisions (Oxley et al. 2006, Dultz et al. 2011, Eichelberger et al. 2018). Clearly there is a need to address pedestrian and motor vehicle interactions in locations where there are high volumes of pedestrians and licenced venues. During high alcohol times, it is unlikely that the road network is required to cater for peak volumes of motor vehicle traffic.

[1] http://www.tac.vic.gov.au/road-safety/statistics/lives-lost-year-to-date

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As such, measures to reduce vehicle speeds and increase pedestrian priority could be applied to reduce the risk of injury without a substantial impact on vehicle movement. Street lighting was also identified as a potential issue that may help to reduce the risk of collisions at night time, with 11 percent of crashes that occur while it is dark occurring in locations with no street lighting.

In general, males were also over-represented at all levels of pedestrian trauma, however in some instances the differences were not statistically significant. The findings are also supported by previous Australian studies that have identified gender differences. For example in the previous research Senserrick et al. (2014) identified a similar gender bias and recommended that educational initiatives that focus on promoting safe crossing behaviours may be an appropriate method for reducing trauma, particularly amongst younger males, who are more likely to engage in risky crossing manoeuvres.

Not surprisingly, speed environment was a major factor identified in the research. When considering pedestrian crashes as a whole, the majority were found to occur in urban areas, with the highest proportion of crashes occurring in 60 km/h speed zones. This finding suggests that minor arterial roads represent a significant concern for pedestrian safety. This is likely due to the increased integration of pedestrians and motor vehicles in these lower speed arterial environments. However, there was a significant association between injury outcome and higher speeds. This finding confirms the increased risk for pedestrians when interacting with vehicles in environments where the speed limit is 50 km/h or above. While it is noted that estimates of vehicle travel speed are not recorded in the datasets, the posted speed limits are an indication of general travel speeds.

The spatial analysis undertaken in this report indicated clusters of pedestrian crashes in areas with high numbers of pedestrians, in these locations it would be appropriate to also consider reducing speed limits on the arterial road network. This may help to alleviate some of the risk to pedestrians, particularly in areas currently posted with 60 km/h speed limits.

When considering the characteristics of vehicles involved in collisions with pedestrians, the research confirmed that the vast majority of pedestrian injuries resulted due to collisions with cars and other light vehicles, reflecting their dominance of the vehicle fleet.

The findings highlight a need to emphasise pedestrian safety amongst motorists, particularly in areas with high concentrations of pedestrians including the Melbourne CBD, and major urban and regional centres. The crash statistics presented in this report demonstrate the disproportionate number of crashes occurring in highly pedestrianised areas. In these locations there is clearly a need to prioritise pedestrians over motorised modes of transportation. This can be achieved through:

- A reallocation of priority away from motorised modes and a reallocation of space towards increased pedestrian activity;
- Reduced speed limits and street design for lower speed; and
- Enforcement strategies that discourage dangerous driver behaviours to target aberrant behaviours when interacting with vulnerable road users.

The findings suggest that some driver characteristics may contribute to increased pedestrian collision risk including the presence of alcohol and distraction through mobile phone use. There were also an alarming number of collisions coded as a hit and run. Furthermore, the driver was identified as offending in 46.4 percent of cases, and up to 64.5 percent of crashes. This indicates that improved driver behaviours could substantially reduce the burden of injury to pedestrians. These findings support previous findings of an increased risk due to driver distraction and poor performance (Chong et al. 2018, Dong et al. 2019).

Notwithstanding the high number of offending drivers, there were 35.5 percent of cases where the driver was not classified as offending. It is possible that in some of these cases pedestrian behaviours may have been a contributing factor. While this research cannot ascertain if this is the case, there is a need to further understand pedestrian behaviours to identify the proportion of pedestrians who may be engaging in risky behaviours and if needed develop targeted interventions to improve pedestrian safety.

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While the datasets provide limited information regarding pedestrian behaviour at the time of collisions, what can be ascertained is that the majority of crashes occur when pedestrians are crossing the carriageway. Furthermore, there was a high proportion of collisions involving motor vehicles during turning movements, particularly right turning vehicles. The issue at intersections is further highlighted with roughly half of all pedestrian collisions reported in the vicinity of an intersection. Clearly the findings indicate a need to improve pedestrian safety at intersections.

At intersections drivers are required to give way to pedestrians crossing the street they are turning into, with the exception of a roundabout. However drivers are not required to give way to pedestrians crossing in front of them, even at a stop or give way sign. This is counter-intuitive and makes the give way rules at intersections complicated.

VicRoads are currently increasing the number of fully controlled right turn intersections in an effort to improve road user safety at intersections. Other treatments intended to improve pedestrian safety include partially controlled turns, early starts for pedestrians, exclusive pedestrian phases and in highly pedestrianised zones reconfiguring the priority at intersections to provide for pedestrians ahead of motorists. Threshold treatments, raised platforms and other design measures may also be appropriate in lower speed environments as a traffic calming measure for motorists. Furthermore it is essential that gaps in the walking network are identified and that adequate crossing locations are provided to ensure that long distances between crossing opportunities are minimised, as this can create unsafe pedestrian crossing conditions, especially for more vulnerable pedestrians such as seniors and those with a disability.

It is important to also note that pedestrian trauma is an issue outside of Melbourne and the research identified relatively high incidence rates in key regional centres including Geelong, Ballarat, Bendigo, Shepparton and in the Latrobe Valley. Regional centres in Victoria typically have higher proportions of older adults and addressing pedestrian road safety issues in these regions may substantially reduce the over-representation of older pedestrians. The findings highlight that pedestrian safety is a state-wide issue and that needs to be addressed through a coordinated approach between state and local government and other key stakeholders.

8.1 Limitations

It is noted that there are several limitations with the analyses conducted in this study. The study has relied on a range of datasets, each with their own priorities and methods for data collection and dissemination.

The VPARS dataset provides a link between police reported cases and TAC claims data. While this provides a rich dataset particularly regarding the circumstances of the crash, it does not include information on the exact nature or severity of the injuries. Furthermore a noted issue with many police reported datasets both in Australia and Internationally is under-reporting (Sciortino et al. (2005); Lopez et al. (2000), Alsop & Langley (2001), Rosman (2001), particularly regarding vulnerable road users and collisions that result in minor or no injuries. Furthermore, while the dataset provides some insight into the causal factors of collisions, there is only limited information regarding the pedestrian and driver actions and behaviours immediately preceding the incident that may have contributed to the collision. There are also noted limitations with the use of some of the codes in the dataset, for example the current DCA codes provide limited information regarding pedestrian and vehicle movements, preceding the collision.

Regarding the VISU and COD-URF data, only de-identified aggregate data was available for analysis and this limits the type of analysis that could be undertaken. It is also acknowledged that there are few adequate data sources available to understand active travel trends and there are some noted limitations of the data used in this analysis of pedestrian exposure. Furthermore, this study has utilised an ecological study design, which has only considered relationships at the population level and there are limitations with the use of registration data as not all vehicles types have been captured in the analysis.

Ecological studies are subject to ecological fallacy and further individual level data would be required to provide a more comprehensive understanding of road safety issues for pedestrians. Furthermore, a potential limitation with the use of household travel survey data is that certain walking trips are under-reported, particularly trips undertaken by children which are generally recorded by the adults undertaking the survey, as such there is the potential for under-reporting of walking trips in the dataset. Furthermore, the analysis has only considered walking trips, while many trips undertaken using other modes will also incorporate walking components.

8.2 Future Research

The findings of this research highlight the need for continued improvements in the collection of pedestrian data. The linked police and TAC dataset provides valuable insight into the factors associated with pedestrian collisions, however there is scope for more detailed crash investigation through the use of in-depth studies, where injured pedestrians are recruited and interviewed to obtain a more comprehensive understanding of the causal factors and injury outcomes associated with crashes.

Observational studies or surveys of the pedestrian population would provide valuable insight into issues surrounding pedestrian and road user distraction and behaviours. Naturalistic studies of driver behaviours have proven to provide valuable information regarding driver behaviour (Young et al. 2019). Similar observation study methodologies have been implemented to understand pedestrian behaviour (Horberry et al. 2019), however further research is warranted.

It is clear from the research that there is still a need for improved infrastructure for pedestrians. In terms of further research, this may include reviewing existing Australian design guidelines, evaluations of new and innovative road infrastructure treatments as well as the need for road safety audits to identify safety issues within the road and roadside environment.

A key deficiency identified in this research and previously noted, is the need for accurate measures of exposure when assessing road safety improvements. Currently in Victoria there is limited information available regarding the number and duration of walking trips. While the VISTA travel survey provides an indication, enhanced measures of exposure allow for most accurate and meaningful comparisons to be made and allow for more accurate monitoring to occur over time. These recommendations would ideally be coordinated within a walking strategy for Victoria, which would provide a central reference point for strategically addressing pedestrian issues and encouraging increased safer walking.

8.3 Recommendations

In line with the Victorian road safety strategy, Toward Zero 2016/2020 (Victorian Government) and new targets of Zero2050 (Strandroth et al., 2019), there is a growing realisation that the needs for the most vulnerable road users should be prioritised. Pedestrian safety is at the core of providing safe and accessible environments for vulnerable road users, and it is important that a comprehensive, holistic approach is adopted that includes engineering, legislation, enforcement and behavioural measures (including promotion of active travel).

Within the Safe System pillars, a number of initiatives and efforts are recommended below that have the potential to achieve substantial reductions in the incidence and severity of on-road pedestrian deaths and serious injuries in Victoria.

8.3.1 Safer Speeds and Safer Roads

Efforts to lower vehicle speeds in areas where there is a mix of pedestrians, vehicles and other road users is a critical step to address pedestrian safety. Ideally when pedestrians and motorised vehicles interact traffic speeds should be reduced to a level that, in the event of a collision, would not result in a serious injury to the pedestrian. While research suggests that this threshold is 40 km/h for an adult interacting with a light vehicle, best practice suggests that 30 km/h speed limits are preferred (ITF/OECD 2018, Corben 2020).

As noted by Corben (2020), 30 km/h speed limits in local streets offer the simplest and lowest cost means of designing for Safe System risk levels for pedestrians and cyclists. However, with the current default urban speed limit of 50 km/h, a move to more widespread 40 km/h limits would still be a step in the right direction. Even at 40 km/h, significant investment in infrastructure would ideally accompany reduced speed limits to secure travel speeds in local streets to genuinely low risk levels for pedestrians and cyclists. There has been long-standing discussion and debate about the long-term effectiveness of introducing lower speed limits in local streets (i.e., below the 50 km/h urban default) without also constructing supporting traffic-calming infrastructure.

In addition to lowering vehicle speeds, treatments that provide separation of travel modes and aligned with Safe System principles have shown promise in reducing exposure to risk and reduced pedestrian fatalities and serious injuries. Such treatments include: pedestrian priority areas; footpaths; smart and conspicuous crossing facilities; refuge islands and raised medians; and removal of slip lanes.

Additional treatments that achieve improved sight distance and/or visibility between drivers and pedestrians include: enhancements to crossing facilities including raised crosswalks, improved lighting at crosswalks and intersections and kerb extensions.

Recommendations include:

- Reductions in speed limits, including to 30 km/h in areas of high pedestrian activity and residential streets;
- Speed limit reductions are supported with appropriate traffic calming infrastructure to ensure drivers and riders are compliant with speed limits;
- Provision of more pedestrian oriented developments (pedestrian prioritisation);
- Implementation of Safe System aligned treatments to separate vulnerable road users and vehicles and create safer crossing points;
- Implementation of Safe System aligned treatments to improve sight distance and visibility of pedestrians;
- Provision of safe, convenient and direct walking routes to minimise the need for risky walking behaviours; and
- An ongoing program of state government investment to deliver these improvements.

8.3.2 Safer Vehicles

There have been substantial improvements in vehicle design, occupant protection features and rapid development of safety features that have the potential to reduce the incidence and severity of pedestrian collisions. Some vehicle technologies (active safety features) can assist in collision avoidance or reducing impact speed, principally through alerts and/or speed reduction through brake-assist or autonomous braking systems, forward collision warning systems, intelligent speed adaptation systems, rear-facing cameras and warning systems, and night enhanced vision systems. These systems can reduce severity or prevent pedestrian injuries regardless of the vehicle type and specific body region. Other vehicle design features and technologies are designed to minimise pedestrian injury in the event of a collision. These systems include enhanced frontal and bumper designs, particularly changes in the shape and the stiffness of vehicle frontal structures, provision of pedestrian airbags, increasing the crush depth between the outer surface of the vehicle and hard objects underneath (such as engine parts), and also by modifying the stiffness of the vehicle's structure below the outer surface so that in an impact it absorbs as much energy as possible without causing injury. ANCAP testing now includes tests for pedestrian protection.

The deployment of new vehicle technologies has the potential to yield a new wave of road safety and other benefits and can play a key role in managing the safety of pedestrians. Recommendations include:

- Development of programs and initiatives to address improved uptake and awareness of safer vehicles (e.g., targeted education campaign on safe vehicle purchase and use; providing financial or other incentives for purchasing safer vehicles);
- Enhance and further promote existing information and resources such as www.howsafeisyourcar.com.au, www.ancap.com.au, used car safety rating guides; and
- Further development of technologies to assist with detection of pedestrians and crash avoidance.

8.3.3 Safer Road Users

Effective behavioural, educational and training programs can be integrated with and support speed reduction, road design and vehicle safety improvements and are essential components of an aspirational Safe System. Concurrent initiatives to promote active travel and walkable communities are essential, and programs should be targeted for particular vulnerable groups.

Recommendations include:

- For drivers, develop educational and training programs addressing pedestrian safety and adoption of safer driving practices and enforcement of lawful driving;
- Support national efforts to promote walking and walkable communities through health promotion campaigns;
- For older pedestrians, development and implementation of education and behavioural programs providing information on schemes and initiatives to support and promote active travel, technologies and other media to provide active travel information.;
- For children, development and implementation of educational and training programs promoting safe active travel co-ordination with schools, parents and councils to provide safety around school environments; and
- For young adults, development of programs addressing alcohol and drug use and walking, alongside measures to manage the road environment around alcohol venues.

8.4 Conclusions

This study employed analyses of multiple injury register datasets to develop a comprehensive understanding of the issues and factors associated with pedestrian injury across all levels of trauma in Victoria. The findings demonstrated that there was an encouraging increase in walking amongst Victorians, however, pedestrian trauma remained substantial, and high-risk groups included older and young adults. Clusters of pedestrian collisions were identified in urban high pedestrian activity areas and in speed zones of 60 km/h. The findings also suggested that drivers were often either alcohol-impaired or distracted, and there was a substantial proportion of hit and run events. Recommendations centre around implementation of Safe System principles and include reductions of vehicle speeds in high pedestrian activity areas and supporting road infrastructure, promotion of safer vehicles, and development and implementation of educational and training programs for young pedestrian groups, particularly those engaging in 'drink walking', and drivers.

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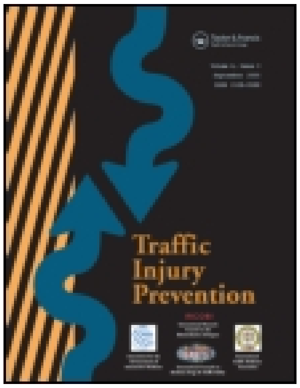

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Bicycle Crashes in Different Riding Environments in the Australian Capital Territory

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Introduction: Cyclists are increasingly overrepresented in traffic crash casualties in Australia. There is evidence that better cycling infrastructure increases participation, but whether it reduces the numbers of injured cyclists is less clear. This study examined injury outcomes of crashes in different cycling environments.

Methods: Adult cyclists injured on- and off-road were recruited from emergency departments from November 2009 to May 2010 in the Australian Capital Territory. Eligible participants (n = 313/372, 84.1%) were interviewed and their injury self-reports were corroborated with medical records where available. Participants who had crashed in transport-related areas (n = 202, 64.5%) are the focus of this article.

Results: Participants had crashed in traffic (39.1%), in cycle lanes (7.9%), on shared paths (36.1%), and on footpaths (16.8%). Based on average weekly traffic counts, the crash involvement rate per 1000 cyclists was 11.8 on shared paths compared to 5.8 on cycle lanes.

Over half of the participants (52.0%) were injured in single-vehicle bicycle crashes. The remainder involved other road users, including motor vehicles (20.8%), other bicycles (18.8%), pedestrians (6.4%), and animals (2.0%). Pedestrians were involved in 16.4 percent of crashes on shared paths. Minor injuries (Abbreviated Injury Scale [AIS] 1) were sustained by 58.4 percent of cyclists, moderately severe injuries (AIS 2) were sustained by 36.1 percent of cyclists, and 5.4 percent of cyclists were seriously injured (AIS 3+). The average treatment required was 1.8 days with 7.5 days off work and cost to the cyclist of $869 excluding medical treatment. Cyclists who crashed on shared paths or in traffic had higher injury severity scores (ISS; 4.4, 4.0) compared to those in cycle lanes or on footpaths (3.3, 3.4) and required more treatment days (2.8, 1.7 versus 0.0, 0.2).

Conclusions: Fewer cyclists were injured in on-road cycle lanes than in other cycling environments, and a high proportion of injuries were incurred on shared paths. This study highlights an urgent need to determine appropriate criteria and management strategies for paths classified as suitable for shared or segregated usage.

Supplemental materials are available for this article. Go to the publisher's online edition of *Traffic Injury Prevention* to view the supplemental files.

Keywords: bicycle, shared paths, pedestrian–cycle crashes, cyclist–cyclist crashes

Introduction

Cycling is often promoted as an energy-efficient, sustainable travel mode with many advantages over motorized transport, including personal and public health benefits (Australian Sports Commission [ASC] 2008). However, cycling is also relatively risky compared to other forms of transport, due to the fragility of the unprotected human body (Shinar 2012). In Australia, the proportion of seriously injured road crash casualties represented by cyclists has increased from 11 percent in 2001 to almost 15 percent in 2008 (Australian Institute of Health & Welfare [AIHW] 2009, Australian Transport Safety Bureau 2004). Between 2000 and 2008, the estimated number of cyclists in the population increased by 36 percent and the age-standardized rates of seriously injured cyclists increased by 47 percent (AIHW 2009). As more Australians take up cycling, it would seem evident that the number injured will also increase (Sikic et al. 2009).

Various strategies are used to reduce cyclists' crash risk, including traffic facilities, such as cycle lanes, advanced stop lines, and shared paths (Koorey et al. 2010; Petritsch et al. 2006). Some studies have found relatively low crash risk associated with bicycle-only facilities—for example, on-road marked cycle lanes and off-road cycle paths—but these studies have focused on crashes involving motor vehicles as the

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primary source of risk (Koorey et al. 2010; Lott and Lott 1976; Petritsch et al. 2006). Others have found that separating bicycles from motorized traffic does not necessarily increase cycling safety (Forester 2001; Heesch et al. 2011; Pasanen 1999). Though there is evidence that such facilities increase participation, there is less evidence of their effectiveness in reducing crash risk, at least in evaluations published in the peer-reviewed literature (Wegman et al. 2012). Such evaluations are challenging due to the complexities of establishing true comparisons between different treatments while controlling for factors such as changes in cycle traffic volumes. Reviews of the literature also tend to prove inconclusive because many reported evaluations do not clearly define the types of bicycle facilities being studied (Hallett et al. 2006; Reynolds et al. 2009).

The Australian Capital Territory (ACT) has a well-established and extensive, integrated community transport network including on- and off-road routes designed to link key destinations such as town centers and major employment areas (Roads ACT 2007). ACT has the highest cycling participation rate (18.2%) in Australia compared to other states (9.6%–15.2%; ASC 2008). The serious injury rate for cyclists is also significantly above the national rate (31 versus 23) per 100,000 population (AIHW 2009). In the years between 2000 and 2008, the ACT recorded the highest average annual increase in counts and age-standardized serious injury rates (18.5%, 95% confidence interval [CI]: 8.2–29.8) for pedal cyclists (AIHW 2011). This study aims to examine the characteristics and outcomes of crashes in different cycling environments in the ACT in order to identify potential countermeasures to reverse this increasing trend.

Methods

Study Design

A cross-sectional study of bicycle crashes in the ACT was conducted in the summer/autumn seasons between November 2009 and May 2010. The study area is a defined geographic region consisting of an urban center surrounded by a rural region with a population of 345,900 (Australian Bureau of Statistics 2010). Eligible participants were residents of the study area, aged 17 to 70 years, injured in a bicycle crash, who presented to either the regional public hospital or private hospital emergency departments in the study area. Cyclists were not approached to participate if they had severe head (AIS 3+) or spinal injuries (AIS 4+) as rated on the Abbreviated Injury Scale (AIS; Association for the Advancement of Automotive Medicine 2005), had posttraumatic amnesia for 24 h or more, rated less than 13 on the Glasgow Coma Scale (Teasdale and Jennett 1974), or were considered to be medically unfit or otherwise unable to provide informed consent.

Posters and brochures about the study were distributed throughout the bicycle community, on websites, in retail outlets, and in hospital waiting areas. Potential participants were identified from hospital records, contacted by mail, and then phoned to request their participation. Those who agreed to participate were interviewed either in person at the hospital or at home by telephone.

The interview consisted of questions adapted from a comparable motorcycle crash study (de Rome et al. 2011). Questions related to the crash location and circumstances, estimated speed, the extent of injuries and associated costs, in addition to background information on demographic and cycling exposure.

Injury details were recorded at interview and each reported injury was independently scored on the AIS by a trained assessor. On this scale, severity is classified from 1 (*minor*) to 6 (*maximum*). The injury severity score is the sum of the squares of the highest AIS scores from 3 body regions. The maximum AIS (MAIS) is the highest AIS code in cases of multiple injuries. MAIS scores were grouped into 4 levels: no injury, AIS 1 (minor), AIS 2 (moderate), and AIS 3+ (serious to maximum). Pain was measured on a horizontal visual analogue scale using a scale of 0 = *no pain* to 10 = *pain as bad as it could be* (Huskisson 1982) The medical records of those participants who attended the public hospital trauma center (58.4%) were used to corroborate interview reports on injury and admission details. Medical records were not available for those who had attended the private hospital.

Crash costs were based on cyclists' own reported out-of-pocket costs, including medical costs in excess of their health insurance coverage, loss of income, and property damage. They did not include the cost of emergency services, hospital, medical, or pharmaceutical services covered by public or private health insurance.

Crash sites were classified into 4 levels of separation from motorized traffic: (1) on-road in traffic, (2) on-road cycle lanes, (3) off-road shared paths, and (4) footpaths (sidewalks). Off-road shared paths are part of the overall ACT community transport network providing trunk routes for walking and jogging and low-speed routes for cyclists (Roads ACT 2007). Shared paths are 2-way with a center line and a minimum of 2.5 m (8.2 ft) wide. Footpaths are paved areas between the roadway and property line, generally in residential and commercial areas. They must be a minimum of 1.5 m (4.9 ft) wide. In the ACT, cycling is permitted in all off-road pedestrian areas including footpaths and other paved public areas such as plazas, but cyclists must give way to pedestrians (Roads ACT 2007).

There are no cycle-only off-road facilities in the transport network. On-road cycle lanes are one-way, signed for cyclists' use with painted delineation, wide-marked shoulders, and wide curbside lanes. Parallel parking is allowed in curbside cycle lanes on lower speed roads ($\leq$60 kmh, 37 mph) with car door opening (0.5 m; 1.6 ft) allowance. Provisions are made for motor vehicles to cross cycle lanes at intersections. Cyclists are not restricted to riding in available cycle lanes and may choose to ride in traffic.

The network consists of 2698 km (1676.5 mi) of roads including 403 km (15%) with on-road cycle lanes. There are 343 km (213 mi) of off-road shared paths (multiuse trails) and approximately 2190 km (1367 mi) of footpaths (Roads ACT, unpublished data, November 18, 2012, Dave Quinlan).

Immediately prior to and during the study, bicycle traffic counts were independently conducted by the roads authority at 41 cycle lane sites and 36 shared path sites. Counts were not available for cycling on footpaths or on-road in traffic. The

Table 1. Characteristics of cyclists by cycling environment of crash site

Row%	In traffic $n = 79$ (39.1%)	Cycle lane $n = 16$ (7.9%)	Shared path $n = 74$ (36.1%)	Footpath $n = 34$ (16.8%)	Total $n = 202$ (100%)
Sex					
Male	52 (65.8)	13 (81.3)	53 (71.6)	20 (58.8)	138 (68.3)
Female	27 (32.2)	3 (18.8)	20 (27.0)	14 (41.2)	64 (31.7)
Age group					
17–25	17 (21.5)	5 (31.3)	7 (9.5)	9 (26.5)	38 (18.8)
26–39	32 (40.5)	6 (37.5)	20 (27.0)	14 (41.2)	72 (35.6)
40+	30 (38.0)	5 (31.3)	46 (62.2)	11 (32.4)	92 (45.5)
Helmet worn ($\chi^2 = 19.5$, df = 3, $P < .0002$)					
No helmet*	4 (5.1)	5 (31.3)	4 (5.4)	10 (29.4)	23 (11.4)
Helmet	75 (94.9)	11 (68.8)	69 (93.2)	24 (70.6)	179 (88.6)

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mean average weekly count per site on cycle lanes was 115.5 cyclists (SD = 98.7, 95% CI: 84.4–146.7) and 258.4 cyclists on shared paths (SD = 227.5, 95% CI: 155.1–361.6; calculated from unpublished data provided by Roads ACT, May 14, 2010, Marian Jancewicz). The estimated total exposure over the 24 weeks of the study was 2772 (115.5 × 24) on cycle lanes and 6192 (258.4 × 24) on shared paths.

The default speed limit in the ACT of 50 km/h (31 mph) applies to all areas, including shared paths, footpaths, and car parks, unless other speed limits are posted (Roads ACT 2003). ACT design standards define 2-way shared-paths' function including cycling speeds according to width (≤20 km/h on 2.5 m; ≥30 km/h on 3.0 m; Roads ACT 2007).

Non-transport-related environments including sporting facilities (e.g., mountain bike trails, BMX parks) were excluded from this analysis. Age was categorized into identified crash-risk age groups 17–25, 26–39, and 40 years or older (Australian Transport Safety Bureau 2004).

All crashes in the riding environments of interest are required by ACT law to be reported to police. Crashes were classified by road user movement codes in the first impact (Roads & Traffic Authority 2007). Crashes were defined by number of vehicles (single/multivehicle) and incident type, including falls (not involving other road users), collisions (e.g., other vehicles, pedestrians, and animals), and conflicts (crashed avoiding a collision). Crashes involving pedestrians or animals were also classified as single-vehicle crashes (Roads & Traffic Authority 2011).

Likelihood ratio chi-square and Fisher's exact tests were used, when appropriate, to examine differences in proportions between groups. The analyses were conducted using SAS 9.1 (SAS Institute 2008).

Results

Over the study period, 723 injured cyclists were identified, including 372 eligible for the study and 351 ineligible. Overall 84.1 percent ($n = 313$) of eligible cyclists participated, 9.9 percent ($n = 37$) were not contactable, and 5.9 percent ($n = 22$) declined to participate. Ineligible cyclists were underage (<17 years, $n = 227$, 61.0%), not local residents ($n = 73$, 19.6%), or excluded on medical grounds ($n = 4$, 1.1%). A further 13.4 percent had either been misclassified as a cycling crash ($n = 25$) or had crashed outside the study area ($n = 16$) or time period ($n = 6$). This analysis reports on the 202 (64.5%) eligible riders who crashed in transport-related environments. The majority (58.4%) were recruited through the public hospital emergency department, 36.6 percent through the private hospital. and 5.0 percent volunteered in response to the publicity.

Overall, 39.1 percent of crashes occurred in traffic ($n = 79$), 7.9 percent on cycle lanes ($n = 16$), 36.1 percent on shared paths ($n = 73$). and 16.8 percent on footpaths ($n = 34$). Using available cycle traffic counts, the crash involvement risk per 1000 cyclists using cycle lanes was 5.8 (16/2772 × 1000) compared to 11.8 for shared paths (73/6192 × 1000).

There were no significant age or sex differences in the proportions of those who crashed in each cycling environment (Table 1). The majority of participants (88.6%) wore helmets, but usage was lower for those in cycle lanes (68.8%) and on footpaths (70.6%), $\chi^2 = 19.5$, df = 3, $P < .0002$, than in the other environments.

Table 2 shows the distribution of crash types. Half of the participants (50.0%) had been injured in falls, 34.7 percent collided with another road user, and 15.3 percent crashed trying to avoid a collision. Where other road users were involved, they were almost equally likely to be another cyclist ($n = 38$) or motor vehicle ($n = 42$).

Motor vehicles crashes 20.8 percent ($n = 42$) included 13 crashes where a motor vehicle failed to give way at adjacent intersections, 7 turned across the cyclist's path, 3 rear-end collisions, 2 door openings, and 3 overtaking sideswipe. Two occurred when cars emerged from driveways, and one car crashed off a road onto a shared path. One cyclist was injured by an object thrown by an abusive motorist. Ten motor vehicle collisions were due to the cyclists' actions, including 3 emerging from a footpath or shared path, 3 failing to give way at intersections, 2 overtaking/lane changes, and 2 crashes into parked cars.

Most participants (73.0%) had been cycling alone, but a substantial proportion (45.3%) of cycle–cycle crashes occurred while in groups, Approximately half of the cycle–cycle crashes occurred mid-block in traffic ($n = 19$) with the remainder mostly on shared paths ($n = 17$).

Across cycling environments, over half the cyclists (55.0%) estimated their traveling speed prior to the crash to be 20 km/h or less. Those traveling at relatively high speeds (>31 kms) had mostly been cycling in traffic (35.4%) or in cycle lanes (31.3%),

Table 2. Characteristics of crashes by cycling environment

	In traffic $n = 79$ (%)	Cycle lane $n = 16$ (%)	Shared path $n = 74$(%)	Footpath $n = 34$(%)	Total $n = 202$ (%)
Type of crash					
Collision	41 (51.9)	7 (43.8)	18 (24.7)	4 (11.8)	70 (34.7)
Fall	29 (36.7)	5 (31.3)	41 (56.2)	26 (76.5)	101 (50.0)
Fall avoiding collision	9 (11.4)	4 (25.0)	14 (19.2)	4 (11.8)	31 (15.3)
Involvement of other road user					
Pedestrian	1 (1.3)	—	12 (16.4)	—	13 (6.4)
Other cyclist	19 (24.1)	1 (6.3)	17 (23.3)	1 (6.3)	38 (18.8)
Motor vehicle	28 (35.4)	9 (56.3)	1 (1.4)	4 (11.8)	42 (20.8)
Animal	—	—	2 (2.7)	2 (5.9)	4 (2.0)
None	31 (39.2)	6 (37.5)	41 (56.2)	27 (79.4)	105 (52.0)
Cyclists' estimation of own speed prior to crash (km/h)					
20 km/h or less	33 (41.8)	7 (43.8)	41 (56.2)	30 (88.2)	111 (55.0)
21–30 km/h	17 (21.5)	4 (25.0)	18 (24.7)	4 (11.8)	43 (21.3)
31–40 km/h	18 (22.8)	4 (25.0)	9 (12.3)	—	31 (15.3)
Over 40 km/h	10 (12.7)	1 (6.3)	2 (2.7)	—	13 (6.4)
Unknown	1 (1.3)	—	3 (4.1)	—	4 (2.0)

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but 15.1 percent had crashed on shared paths. Overall, one in 10 cyclists (10.9%) identified their own speed as a contributing factor, including one in 5 of all crashes on shared paths. Nine cyclists had been drinking alcohol prior to the crash. Road surface hazards such as potholes, loose gravel, or debris were identified as contributing factors in 9.4 percent of crashes.

Further details are provided in Appendix A1 (see online supplement). Cyclists were asked about the speed limit that applied in the area where they crashed. Most of those cycling in traffic (97.5%) or on cycle lanes (100.0%) were able to give the speed limit that applied to the road where they crashed. In contrast, 12.3 percent of those who had crashed on shared paths and 23.5 percent of those who crashed on footpaths believed that no speed limits applied. Of those who crashed on shared paths ($n = 73$), 67.1 percent thought the speed limit was 50 km/h (31 mph), 4.1 percent said 60 km/h (37 mph), and 15.1 percent nominated speeds between 70 and 100 km/h (44–62 mph). Of those who crashed on footpaths ($n = 34$), 44.1 percent thought the speed limit was 50 km/h, 14.7 percent nominated 60 km/h, and a further 14.7 percent nominated 80 km/h (50 mph), although the highest reported traveling speed on a footpath was 28 km/h (17 mph).

Cyclists were also asked whether they had been carrying anything that might have contributed to the crash by affecting their balance. Over half (54.5%) had been carrying some additional weight, mostly in backpacks (54.4%), with some panniers (11.1%) and shopping bags (10.0%). The average weight carried was 4.4 kg (9.7 lb), with 8 percent carrying between 10 and 20 kg (22–44 lb).

Overall just 17.3 percent of crashes ($n = 35$) were reported to police, mostly crashes that occurred in traffic or on cycle lanes and involved a motor vehicle, $\chi^2 = 22.2$, df = 6, $P < .001$. None of the cyclists in crashes involving pedestrians were aware of these incidents being reported to police.

Single Bicycle-Only Crashes

Of the bicycle-only crashes (122/202, 60.4%), almost half (49.2%) were due to the cyclist losing control on a straight section of road, 13.1 percent due to losing control on curves, 19.7 percent involving collisions with objects on the path, and 3.3 percent involved animals. Pedestrians were involved in 10.7 percent ($n = 13/122$) of all bicycle-only crashes and 20.0 percent ($n = 11/55$) of those on shared paths. Half of the pedestrian crashes involved actual impacts with a pedestrian and half occurred avoiding a pedestrian (see Table 2).

Equipment failure accounted for 24.0 percent of single-vehicle crashes, including bicycle maintenance problems such as flat tyres or dropped chains (13.1%) and problems disengaging shoe cleats or toe clips (7.4%). Four crashes involved dogs on leads, including 3 where the cyclist was walking his or her dog while riding. Impacts with objects on the path included 18 impacts with road furniture such as guardrails, curbs, and bollards and 2 collisions into parked cars. Debris such as leaf litter or mud on the path (3.2%) and road surface damage (8.2%) was a contributing factor in 11.5% of single-vehicle crashes.

Injuries Sustained

Table 3 compares injury type and severity by cycling environments. The majority of injuries were minor (AIS 1, 58.4%), 36.1 percent were moderately severe (AIS 2), and 5.4 percent were serious injuries (AIS 3+). Those with serious injuries (AIS ≥ 3) had been riding either in traffic or on shared paths and were more likely to be admitted to hospital than were those on cycle lanes or footpaths (Fisher's exact test, $P = .03$). Other crash outcomes including injury severity scores, pain, and days in treatment were analyzed by cycling environment and road users involved (single bicycle, motor vehicle, other cyclist or pedestrian), but no significant differences were detected.

Almost a quarter of the cyclists (23.3%) had head injuries, 64 percent had injuries to their lower limbs, 55.9 percent to the upper limbs, and 51.0 percent to the shoulders. Though soft tissue injuries including cuts, lacerations, abrasions (81.2%), and bruises (67.3%) were most common, substantial proportions sustained sprains (55.9%), fractures (42.6%), and internal organ injuries (22.8%). There were few significant differences in types of injury associated with the different cycling environments, although those who crashed while cycling in

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Table 3. Injury consequences of crashes by cycling environment

	In traffic $n = 79$ (39.1%)	Cycle lane $n = 16$ (7.9%)	Shared path $n = 74$ (36.1%)	Footpath $n = 34$ (16.8%)	Total $n = 202$ (100%)
Hospitalization (Fisher's exact test, $P = .03$)					
Admitted	15 (19.0)	—	12 (16.2)	1 (2.9)	28 (13.9)
Maximum injury severity (AIS)^{NS}					
AIS 1	43 (54.4)	11 (68.8)	41 (55.4)	23 (67.6)	118 (58.4)
AIS 2	31 (39.2)	4 (25.0)	28 (37.8)	10 (29.4)	73 (36.1)
AIS 3+	5 (6.3)	1 (6.3)	4 (5.4)	1 (2.9)	11 (5.4)
Injury severity—Mean (SD)					
Days in treatment^{NS}	1.7 (5.5)	—	2.8 (13.7)	0.2 (1.1)	1.8 (8.9)
Injury severity score^{NS}	4.0 (2.8)	3.3 (2.5)	4.4 (4.3)	3.4 (2.9)	4.0 (3.4)
Pain ($n/10$)^{NS}	7.2 (2.3)	6.9 (2.5)	6.9 (2.4)	6.0 (1.9)	6.9 (2.3)
Days off work	7.4 (8.6)	8.2 (12.1)	8.1 (14.2)	5.9 (6.6)	7.5 (10.9)

NS = Not Significant.

traffic or on shared paths were more likely to have sustained shoulder injuries ($\chi^2 = 18.9$, df = 3, $P = .0003$), spinal injuries ($\chi^2 = 14.04$, df = 3, $P = .003$), and hip injuries ($\chi^2 = 8.1$, df = 3, $P = .04$).

Almost three quarters (74.3%) of the cyclists required time off work following the crash. The average number of days off was 7.5. The out-of-pocket personal costs were \$869.20 on average, and higher for those who crashed in traffic (\$1058.90) or cycle lanes (\$1104.50). There were no significant differences between cycling environments and time off work or crash costs. Further details are available in Table A2 (see online supplement).

Discussion

This study provides important information about the relative burden of cycle crash injuries sustained in the various cycling environments in the ACT. Understanding where cycle injuries occur is important for the development of countermeasures, particularly in the ACT, which is regarded as a role model for other Australian jurisdictions (ASC 2008). The ACT has the highest cycling participation in Australia and cycling crashes represent a substantial and increasing burden of injuries in the ACT (AIHW 2011).

The aim of this article was to describe the characteristics of crashes associated with injury in different cycling environments. The results suggest that riding environment plays a major role in cycle safety, with relatively few injury crashes in the extensive network of on-road cycle lanes compared to riding in traffic or on off-road shared paths and footpaths.

The results confirm the findings of other studies that a substantial proportion of cycle casualties are injured in single-vehicle crashes (Heesch et al. 2011; Jacobson et al. 1998; Schepers 2011). Road environment hazards accounted for a small proportion compared to behavioral factors, including lack of bike maintenance, equipment failure, excessive speed, alcohol use, or carrying an excessive or unbalanced load. The prevalence of such factors suggests a role for interventions directed at modifying cyclists' behaviors to engender safer riding practices and extend cyclists' awareness of the wider range of hazards in addition to motor vehicles. Further work could also focus on factors involved in cycle-to-cycle crashes in order to identify risky practices, particularly in group riding.

The fact that hospital presentations due to cycle-to-cycle crashes almost equated the number of those involving motor vehicles serves to emphasize the vulnerability of the unprotected human body, in particular the fact that serious injuries can occur in falls without the added agency of speed or vehicle mass. Whereas cycle-to-cycle road crashes occurred mid-block, crashes involving motor vehicles were most likely to occur at uncontrolled intersections, indicating the need for more effective interventions at these points. This is consistent with studies from the United States and Europe, which have identified roundabouts as relatively high-risk intersection configurations for cyclists (Daniel et al. 2009; Hels et al. 2007).

Perhaps the most important finding is the relatively high crash involvement rate on shared paths compared to cycle lanes. These findings are consistent with other studies that have concluded that separated cycle-only facilities such as on-road cycle lanes have a positive safety effect (Moritz 1998; Reynolds et al. 2009), whereas shared facilities such as footpaths (sidewalks) and shared paths (multiuse trails) have been found to pose higher injury risk than riding in traffic (Aultman-Hall and Hall 1998; Aultman-Hall and LaMondia 2005; Moritz 1998; Reynolds et al. 2009).

The findings for shared paths raise questions that need to be resolved urgently as public policy increasingly promotes their usage (Austroads 2010). Though over half of those injured on shared paths were in single bicycle-only crashes, almost one quarter involved other cyclists and 20 percent involved a pedestrian. Crashes on shared paths and in traffic were also more likely to result in serious injury and to require admission to hospital than those on cycle lanes or footpaths. Though the injury risk of collisions with motor vehicles is undeniable, these findings indicate that undue focus on motor vehicles may lead cyclists to underestimate other sources of injury risk, particularly other cyclists.

The relatively high speeds self-reported on shared paths and footpaths indicate a need for speed zonings and management to be reviewed. Australian guidelines recommend that bike paths be designed for speeds of 30 km/h or more but that speeds on footpaths should not exceed 15 km/h (Austroads 2009). Many of the cyclists who crashed on shared paths referred to them as bike paths, which may reflect longstanding

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usage. The legal status of these paths in relation to traffic regulation requires clarification to ensure that they are under appropriate jurisdiction for traffic management, enforcement, and crash reporting requirements.

There has been relatively little research into bicycle–pedestrian crashes, but there is evidence that the injury kinematics may be quite different from those in motor vehicle–pedestrian impacts. Whereas it is the primary impact with the motor vehicle that causes the most severe injuries to a pedestrian, in bicycle–pedestrian impacts the most serious injuries are from secondary impacts to the pedestrian's head with the ground (Sikic et al. 2009). Researchers modeling bicycle–pedestrian impacts have found that the risk of head injury to a pedestrian occurs at impacts from 10 km/h with little evidence of risks increasing as bicycle speeds increase (Short et al. 2007). A recent study of hospital data in New South Wales concluded that though fatal injuries from bicycle–pedestrian collisions are fewer than from motor vehicle–cyclist collisions, the risk of serious injuries is similar (Chong et al. 2010).

It is a fundamental principle of safe systems that road design should ensure that the impact forces of a crash on human bodies do not result in fatal or serious injury (Heesch et al. 2011). An essential component of achieving this goal is the separation of transport modes that are incompatible due to speed or mass resulting in differential impact forces in crashes. There is substantial evidence of the incompatibility of cyclists and motor vehicles but little to justify shifting the risk to shared paths where similar incompatibility exists between pedestrians and cyclists (Aultman-Hall and LaMondia 2005; Chong et al. 2010; Lusk et al. 2011; Reynolds et al. 2009).

Under Australian national guidelines, shared paths are recommended only in areas where pedestrian and/or cyclist usage is low (<10 per hour). In such areas, a minimum path width of 3 m is required where high speeds occur (≥30 km/h) and a minimum of 2.0 m for paths where all usage is always very low (<10 per hour) at all times and on all days (Austroads 2009). However, it is apparent that many of the designated shared paths in the ACT have higher usage than recommended (Roads ACT 2004). This is likely a function of increasing usage as more people engage in walking and cycling, as well as the design limitations of the network, much of which was established many years ago. It would appear that the substantial increase in cycling participation in recent years has overloaded the system in ACT, particularly in those areas that attract high pedestrian and cyclist recreational or commuter usage. As the usage of shared paths increases, it is likely that the burden of injury will shift from bicyclists to pedestrians, particularly older pedestrians (Sikic et al. 2009).

The substantial underreporting of cycle crashes to police observed in this study confirms similar finding of other studies (Langley et al. 2003; Lujic et al. 2008; Richardson et al. 2006). ACT law specifically requires that all crashes, regardless of degree of damage or injury, must be reported to police (Roads ACT 2010). The findings reflect low awareness of this and indicate a need to clarify and promote community awareness of the legal requirement in the ACT to report all injury crashes to police, not just those involving motor vehicles. This is particularly necessary to establish the true prevalence of cycle crashes on all types of cycling facilities.

The conduct of the study in a defined geographic region ensured that participation rates for hospital presentations could be accurately assessed and high participation rates were achieved. Another strength of the study was the availability of contemporaneous traffic counts and definitive information on the total kilometers of cycle lanes and shared paths, which provided a valuable framework for the data obtained. The lack of similar traffic counts for in-traffic areas or footpaths limited comparisons between cycling environments, and the relatively small numbers in the cycle lane and footpath groups also limited the analysis of between-group differences. Though actual kilometers ridden would be a more accurate measure of exposure, these data were not available. The lack of exposure data to provide a baseline for crash rates in different environments is a major limitation of most cycling research in Australia.

The focus on hospital presentations excluded those who sought treatment from other medical services or pharmacies and may have biased the results toward more severe injuries. Conversely, the exclusion of the most severely injured riders in addition to fatalities potentially biased the findings toward those with less severe injuries; however, the total number excluded on medical grounds ($n = 4$) was small.

Because crash location was only determined at interview, we were unable to establish the relative participation rates at recruitment for different cycling environments. As a consequence, we do not know whether there was a bias in participation rates or injury severity. Similarly, the exclusion of children from the study underestimates the total burden of injury due to cycling crashes. Cyclists' traveling speeds were based on self-report; despite cyclists' increasing usage of speedometers, this is a limitation of the study because no independent corroboration was available. The findings also underestimate the total number and severity of individuals injured because data were not collected from the other road users (e.g., pedestrians and other cyclists) involved.

It is likely that the proportion of crashes involving cyclists may represent an emerging community issue, particularly as third-party injury insurance schemes insure against motor vehicle crash injuries but do not cater for people injured by nonmotorized vehicles (ACT Government 2011).

Further investigation into baseline rates of cycle usage and crash involvement associated with different cycling environments is recommended in order to allow a more accurate assessment of the risk posed in different environments and to inform the planning of cycle facilities. This should include comparative data on riders who do not crash in those environments. Future work should include investigation to establish the extent and conditions under which increasing participation in cycling may present increased risk to pedestrians and other cyclists.

The results provide evidence of the relative safety of on-road cycle lanes compared to riding in traffic or on shared paths or footpaths. The crash rates and cycling speeds reported on shared paths indicate an urgent need for review to determine appropriate criteria and speeds for classifying paths as suitable for shared or segregated usage.

The high proportion of single bicycle-only crashes relating to cyclists' actions also suggests that risk management strategies should include bike handling and riding skills, appropriate speeds, and bike maintenance as well as the enforcement of speed, alcohol, and crash reporting laws.

The low proportion of crashes involving motor vehicles also indicates that attention needs to be directed to other sources of injury risk, particularly crashes with other cyclists and factors contributing to single bicycle falls. The findings in the context of increasing cycling participation and crash numbers suggest that exposure is not the only factor and caution should be applied in assuming the principles of safety in numbers in transportation policy and planning.

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