Proceedings of the 2021 Australasian Road Safety Conference

Year of Publication: 2021
Publisher: Australasian College of Road Safety
ISBN: 978-0-6481848-4-3

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Preface

Welcome to the 2021 Australasian Road Safety Conference.

After postponing the 2020 conference by a year due to the COVID-19 pandemic, we are pleased to present the proceedings for the first fully virtual format for this conference. This is the sixth conference in the series that commenced with amalgamation of the Road Safety Research and Education Conference and the Australasian College of Road Safety Conference. This conference is a unique opportunity for everyone involved in road safety including researchers, practitioners, policymakers, police, educators, advocates and community groups to meet, present and discuss their work.

These proceedings describe research, educational and policing program implementation and policy and management strategies related to all aspects of road safety and especially related to the conference theme of Towards Zero: A Fresh Approach.

This year's conference covers a comprehensive range of topics including speed, infrastructure and road design, education, licensing, vehicle design, impairment due to alcohol, drugs and mobile phones. The conference also presents innovative symposium sessions including interdisciplinary approaches combining safety, the law and design and showcasing successful programs involving at-risk youth, older drivers and safety approaches for non-occupants, specifically when we walk and ride a bicycle. Around 600 delegates from 28 countries will be attending the on-line virtual conference.

Authors of accepted Extended Abstracts and Full Papers represent international and local institutions from all aspects of their respective communities including research centres, private companies, government agencies and community groups. These Extended Abstracts provide an indication of the important work being done in Australia, New Zealand and internationally as part of the United Nations, One UN Vision for Road Safety to reduce the number of crashes on the road by 50 percent by 2030.

The Conference Organising Committee allowed two manuscript types for the conference: 'Extended Abstracts' and peer-reviewed 'Full Papers'. Using a similar format to the previous successful conference in 2019, the Conference Scientific sub-Committee initially called for submissions in the form of Extended Abstracts (approx. 1 to 3 pages). Groups of submissions around similar themes were assigned to Conference Handling Editors with senior peer status in the respective field of road safety, who then handled the review process for their assigned submissions. Each Extended Abstract was reviewed by two independent expert peer reviewers on the following selection criteria: content consistent with the conference theme, novelty of information or data, clarity, relevance to practice or policy, scientific merit, and interest to audience. The Conference International sub-Committee also assisted with the review of Lower and Middle Income Country (LMIC) submissions and also allocating LMIC mentors for those authors

requesting assistance with their submission. A total of 182 Extended Abstract manuscripts from 245 submissions were accepted as Extended Abstracts.

Authors were also provided the option of submitting a Full Paper, which is HERDC* compliant. Based on the outcome of the peer review of their Extended Abstract, some authors who requested extension of their submissions into Full Papers for a run on into the Journal of Road Safety, were provided that opportunity by the two peer reviewers. The submitted Full Paper subsequently underwent a further review by three independent (new) peer reviewers for inclusion into the Journal of Road Safety. There were seventeen Full Paper submissions of which four have so far been fully peer-reviewed and accepted for publication in the Journal.

For the first time in the conference series the ACRS2021 partnered with Monash University's Monash Art, Design and Architecture (MADA) this year to link Poster authors with final year graphic design students and alumni. This gave authors an opportunity to develop high quality visual communications of their poster content. The eight Authors who chose this option that were matched with a MADA graphic design student and successfully completed the Poster, have had their Poster attached to their Extended Abstract pdfs in these Proceedings. The Poster authors were also provided a 5 minute oral Poster presentation slot in one of the conference program parallel sessions.

An additional incentive to provide potential authors from Lower and Middle Income Countries (LMICs) an opportunity to submit an Extended Abstract and attend the conference, was the establishment of a LMIC Scholarship provided by the Department of Infrastructure, Transport, Regional Development and Communications. The scholarships assisted LMIC presenter delegates with covering their registration fee. Scholarships were allocated to authors of 14 Extended Abstract submissions across 9 countries – Afghanistan, Bangladesh, Cambodia, India, Iran, Malaysia, Myanmar, Thailand and Uganda.

Putting together such a high-quality program requires a contribution from many people. We thank the Conference Handling Editors for taking the time to handle submissions, allocate appropriate reviewers, and provide useful and constructive feedback to authors. Likewise, we are grateful to our road safety peers for their help in reviewing 245 Extended Abstract submissions. The high calibre of the conference proceedings is only achieved with their assistance and we thank them all for contributing their valuable time. We also warmly thank all the keynote speakers, symposium organisers and presenters, the Conference Organising Committee, the Scientific sub-Committee, the International sub-Committee, the Social Activity sub-Committee, the Sponsorship sub-Committee, the conference sponsors, and the session Chairs. The valuable input and enthusiasm from each person and group has helped to ensure the 2021 Australasian Road Safety Conference meets the needs of the diverse range of participants and contributes to the overall success of the event. Most importantly, we trust that the work described in these proceedings Extended Abstracts and the Full Papers that will be published in the Journal of Road Safety**, will contribute to the reduction in road trauma in Australia, New Zealand and internationally.

These proceedings include the list of the: conference committees and members; Conference Handling Editors; Peer-Reviewers; a copy of the conference program; and, a list of all the Extended Abstracts. All Extended Abstract will be available post conference on the Australasian College of Road Safety publication search engine***.

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* https://www.education.gov.au/higher-education-research-data-collection

** https://acrs.org.au/journals/

*** https://acrs.org.au/publications/

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CONFERENCE PROGRAM

This draft program is subject to change.
All times are Australian Eastern Standard Time (AEST)

	Monday, 27 September 2021 Conference Pre-Day
	Pre-Conference Meetings/Events
2:30-4:00pm	Early Career Professionals Event
4:00-5:30pm	ACRS International Outreach Chapter (IOC) Event

	Tuesday, 28 September 2021
8:30-9:10am	**Opening Plenary Session** Chair: **Mr Chris Brennan**, Manager Road Safety Strategy & Data, Road Safety Victoria, Department of Transport **Welcome to Country,** Wurundjeri Woi-Wurrung Cultural Heritage Aboriginal Corporation **Hon Ben Carroll MP**, Minister for Public Transport and Minister for Roads and Road Safety **Dr Ingrid Johnston**, CEO, Australasian College of Road Safety **Dr Geoff Allan**, CEO, Austroads
9:00-10:30am	**Plenary 1** **Doing road safety differently – what needs to change?** Chair: **Dr Marilyn Johnson**, Senior Researcher, Institute of Transport Studies, Monash University **Ms Maria Fernanda Rodriguez Bongoll**, President of the Board, Fundacion Gonzalo Rodriguez **Dr Soames Job**, CEO and Principal, Global Road Safety Solutions Pty. Ltd. Followed by a panel discussion between all Plenary 1 speakers
10:30-11:00am	**Morning Tea, Exhibition + Open networking**

	Concurrent Sessions 1					
Topic	**Road audit/assessment**	**Crash data analysis 1**	**Older road users, caravans and buses**	**Licensing and Young drivers**	**Education**	**Motorcycle riders**
11:00-11:15	7 **John Poynton** Safe System Solutions Pty Ltd *A safe access audit tool for active transport*	224 **Chris Stokes** The University of Adelaide *Using in-depth accident data to identify limitations when applying crash injury risk curves*	158 **Marilyn Di Stefano** Road Safety Victoria Department of Transport *Medical Fitness to Drive: Development of Transport and Medical Practitioner partnership to enhance road safety*	100 **Prasannah Prabhakharan** University of New South Wales *Assessing the Ecological Validity of Button-Press Hazard Perception Tests*	244 **Nicole Downing** Department of Transport and Main Roads *An omnichannel approach: Queensland's Road Safety Education Blueprint for Children and Youth*	77 **Lucy Filardo and Teresa Senserrick** Centre for Road Safety and CARRS-Q, QUT *Evaluation of the NSW Motorcycle Graduated Licensing Scheme*
11:15-11:30	150 **Robyn Gardener** Fulton Hogan Ltd *Developing a Geo Artificial Intelligence Process to Assist with Programme Evaluation*	120 **Laurie Budd** Monash University Accident Research Centre (MUARC) *Future Light Vehicle Safety Priority Areas in Australia*	168 **Rebecca McLean** University of Otago Dunedin School of Medicine *Screening older drivers: The experiences of General Practitioners with medical fitness to drive assessments*	94 **Natalie Watson-Brown** CARRS-Q, QUT *Bad habits while racing to the starting line: Obstacles to the development of young Learner's safe driving practices*	119 **Louise Cosgrove** Macquarie University - Kids and Traffic *Responsivity and innovation in road safety education: are we listening to our audience?*	247 **Luke Pugsley** Department of Transport and Main Roads *Motorcyclist personas: it's not one size fits al*
11:30-11:45	65 **Kenn Beer** Safe System Solutions Pty Ltd *Roads That Cars Can Read assessment: Practical Applications in NSW*	157 **Murtaza Sultani** Land Transport Authority *Developing a Black Spot Investigation Program for Kabul city Roads*	135 **Mohd Naguib Mohd Yunos** Flinders Medical Centre *Agreement on fitness to drive outcome between rehabilitation medicine physician prediction and occupational therapy on-road assessment*	246 **Nicole Downing** Department of Transport and Main Roads *Reviewing Queensland's Indigenous Driver Licensing Program*	19 **Catharine Hydon** Early Learning Association Australia *Active and Safe: Young children as engaged road users in their communities*	153 **Angelo Lambrinos** Transurban *Transurban Queensland Motorbike Incident Response Trial*
11:45-12:00	49 **Kenn Beer** Safe System Solutions Pty Ltd *Road Safety Capability Requirements for Road Authorities*	125 **Venkatesh Balasubramanian** IIT Madras *Epidemiology and Injury Profiles of Single Vehicle Motorcycle Fatalities in Tamil Nadu, India, 2009-2017*	164 **Marilyn Di Stefano** Road Safety Victoria Department of Transport *Motorised mobility device use: consensus based non-regulatory countermeasures to enhance user road safety*	221 **Lisa Sharwood** The University of Sydney *Can I have your attention please? Piloting an outcome evaluation on pre-novice driving youth aiming to determine the 'bstreetsmart' impact*	51 **Oleksandra Molloy** University of New South Wales *The impact of the medium in which feedback is presented on young drivers' speed management behaviour*	200 **Paul Graham** New Zealand Transport Agency *Motorcycling – unsafe, but legitimate form of transport*
12:00-12:15		95 **Ralston Fernandes and Johan Standroth** Centre for Road Safety and Transport for NSW *Case-By-Case Analysis of Current Fatality Trends to Estimate Future Residual Trauma in NSW*	160 **Carl Liersch** APV-T *Bus passenger protection – are we there yet? After 30 years what are the new challenges to bus safety.*	25 **Brad Crofts / ~~Georgia Symmons~~** Fit to Drive Foundation *LET'S #GOSAFELY A community-based multi stakeholder approach to road safety education for young adult road users*	115 **Chris Stokes** The University of Adelaide *Safe System for Universities: education for tertiary engineering students update*	166 **Siya Aggrey** Makerere University College of Health Sciences *Perceived factors associated with boda-boda (motorcycle) accidents in Kampala, Uganda*
	POSTERS					
12:15-12:20	42 **Fritha Argus** Main Roads Western Australia *Using road inventory data to produce AusRAP star ratings*	34 **Mohammad Ibrahim** Monash University Accident Research Centre (MUARC) *Using relative risk of different travel options as part of journey planning attributes – a case study from Victoria*	75 **Ranmalee Eramudugolla** Neuroscience Research Australia *On-road driving errors in Mild Cognitive Impairment*	142 **Juliet Bartels** Road Safety Victoria Department of Transport *Supervised practice hours among older novice drivers in Victoria: Stakeholder perceptions and readiness to obtain supervised driving practice*	211 **Phillip Mallis** City of Darebin *Darebin's Octopus School Pilot Program*	156 **Ross Blackman** Queensland University of Technology *Motorcycle choice and self-reported crashes of Queensland motorcyclists*
12:20-12:25		57 **Richard Cohan** Transport for New South Wales *The next frontier: Road safety in the workplace*	23 **Jennifer Felsch** Transport for New South Wales *Caravan Safety Awareness Project in northern NSW*			
12:25-12:30	**Marilyn Johnson and Robbie Napper** ARSC2021 and Monash University Poster collaboration					
12:30-12:40pm	Post session networking	Post session networking	Post session networking	Post session networking	Post session networking	Post session networking
12:40-1:30pm	**Lunch, Exhibition**					

	Concurrent Sessions 2					
Topic	**Pedestrians**	**Crash data analysis 2**	**Enforcement and Policing 1**	**Young drivers**	**Symposium 1**	**Symposium 2**
1:30-1:45pm	233 **Joseph Le** Transport for NSW *Development and Delivery of the Pedestrian Protection at Signalised Intersection Mass Action Program*	140 **Denny Meyer** Swinburne University of Technology *Modelling the Relationship Between Driver History and Crash Risk*	167 **Kelly Imberger** Road Safety Victoria Department of Transport *Offence and Crash Involvement of High-Frequency, High-Risk Offenders*	**Mini symposium** **TAC L2P program, enhanced program including youth at high risk (e.g. criminal justice system, homelessness)** **Patrice Smith** City of Casey Paul Moore Road Safety Victoria Department of Transport Sunera Patabendige City of Casey Patrice Smith City of Casey	**Achieving speed management in the Eastern Mediterranean Region** **Lori Mooren** Eng. Hormoz Zakeri National Road Safety Commission, Iran Mohammad Mehdi Besharati Iran University of Science and Technology Mohsen Fallah Zavareh Kharazmi University Mohsen Shams Yasuj University of Medical Sciences **Panelists** Mansour Ranjbar World Health Organisation, Tehran Christoph Hamlemann WHO representative Ali Tavakoli Kashani Iran University of Science and Technology Eng. Javad Hedayati Road Maintenance and Transportation Organization Hassan Abdoss Road Maintenance and Transportation Organization	**Creating opportunity for people who can't access safe mobility and making it a reality** **Jerome Carslake** National Road Safety Partnership Program (NRSPP) Tristan King Empowr Mobility Binyam Tekeie Young driver Naheed Akhtar Laverton Community Education Centre Anthony Cavanagh Ganbina
1:45-2:00pm	151 **Juliet Bartels** Road Safety Victoria Department of Transport *Pedestrian Road Safety Project*	209 **Paul Graham** New Zealand Transport Agency *Estimating the effect of multiple combined interventions: the IILM*	20 **Jenelle Hardiman** Victoria Police *Comparison of Skidding Vehicle Drag Factors on Various Surfaces*			
2:00-2:15pm	39 **Gregoire Larue** CARRS-Q, QUT *Increasing awareness of distracted pedestrians at railway level crossings with illuminated in-ground lights*	28 **Asif Hassan** Transport for NSW *A Structural Equation Model for Pedestrian Crashes in Sydney*	169 **Kelly Imberger** Road Safety Victoria Department of Transport *Effectiveness of Vehicle Impoundment for Victorian High Level Speeders*			
2:15-2:30pm	78 **Michael Regan** University of New South Wales *The Relationship between Pedestrian Waiting Times and Illegal Crossing Behaviours at Signalised Intersections in the Sydney CBD*	126 **Venkatesh Balasubramania** IIT Madras *Analysis of Injury Severity in Single-Vehicle Four-Wheeler Crashes with drivers being at-fault in Tamil Nadu, India*	17 **Max Cameron** Monash University Accident Research Centre (MUARC) *Increasing the effectiveness of mobile speed cameras on rural roads in Victoria based on crash reductions from operations in Queensland*	16 **Lyndel Bates** Griffith University *The Effect of Parenting Styles and Differing Theoretical Frameworks on Young Drivers Self-Reported Compliance*		
2:30-2:45pm	58 and 148 **Joanne Wood** QUT *Making nighttime pedestrians safer using innovative clothing designs*	225 **Gregoire Larue** CARRS-Q *Crashes Classification in Naturalistic Driving Scenarios Using Random Forest Machine Learning Algorithm*	198 **Christopher Poulter** Road Safety Victoria Department of Transport *Investigating driver compliance with Road Rule 79A in Victoria*	43 **Guneet Singh Assi** Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh *Self perception, driving patterns and gender differences on psychological measures of young Indian drivers*		
2:45-3:00pm		107 **David Chircop** Transport for NSW *Analysis of rear-end and other crashes related to roadwork sites in NSW*	**2119** **Laura Mills** University of the Sunshine Coast *Twelve Years of Roadside Drug Testing in Queensland: The Extent and Nature of Recidivism*	76 **Joanne Bennett** Australian Catholic University *Cognitive Function and Driving Performance for Young Drivers: A Systematic Review and Meta-Analysis*		
3:00-3:10pm	Post session networking	Post session networking	Post session networking	Post session networking		
3:10-3.30pm	**Afternoon Tea, Exhibition**					
3:30-5:00pm	**Plenary 2** **Managing road safety within complex systems** Chair: **Professor Narelle Haworth AM**, Faculty of Health, School of Psychology & Counselling, CARRS-Q **Mr Michael Nieuwesteeg**, Program Manager for Road Safety and Design, Austroads **Ms Gabby O'Neill**, Head, Office of Road Safety **Dr Nhan Trann**, Head, Safety and Mobility, World Health Organization Followed by a panel discussion between all plenary 2 speakers plus **Mr Martin Small**, President, Australasian College of Road Safety					

	Wednesday, 29 September 2021					
8:30-10:30am	**Plenary 3** **Will technology save us?** Chair: **Mr Kenn Beer**, Principal Engineer, Safe System Solutions Pty Ltd **Dr Mike Lenné**, Chief of Human Factors & Safety, Seeing Machines **Dr Bud Zaouk,** Founder and CEO of Kea Technologies and the DADSS Program, DADDS **Ms Maree Bridger**, FAS Surface Transport Policy, Office of Road Safety **Ms Carla Hoorweg**, CEO, ANCAP Followed by a panel discussion between all plenary 3 speakers plus **Emeritus Professor Ann Williamson**, Transport and Road Safety Research Centre, School of Aviation, The University of New South Wales					
10:30-11:00am	**Morning Tea, Exhibition, Poster Gallery**					
	Concurrent Sessions 3					
Topic	**Evaluations**	**Seat belts and child restraints**	**Speed 1**	**Heavy vehicles**	**Symposium 3**	**Symposium 4**
11:00-11:15am	21-20 **Amanda Pushka** MicroTraffic Inc. Winnipeg, Manitoba *Comprehensive Safety Assessments and Rapid Evaluations Using Video Analytics and Conflict Data: Innovative Approaches from North America*	72 **Tom Whyte** Neuroscience Research Australia *Side impact intrusion in child passenger deaths and the performance of child restraint systems*	24 **David Soole** Department of Transport Main Roads Queensland *The attribution of casualty crashes to low-level speeding in Queensland*	74 **Jerome Carslake** National Road Safety Partnership Program (NRSPP) *Construction Logistics and Community Safety Australia (CLOCS-A): Progress Towards Safer Outcomes for Vulnerable Road Users*	**Event data recorders** **Sam Doecke** The University of Adelaide Centre for Automotive Safety Research *Event data recorders in cars, an introduction* **Martin Elsegood** The University of Adelaide Centre for Automotive Safety Research *Speeding insights from the CASR EDR Study* **Michael Hardiman** Victoria Police *Real world application of event data recorders* **Giulio Ponte** The University of Adelaide Centre for Automotive Safety Research *Advanced automotive crash notification systems and EDRs*	**How can road safety strategies increase safety for all road users?** **Sam Bolton** Cycling and Walking Australia and New Zealand (CWANZ) **Sara Stace** WSP **Stephen Hodge** We Ride Australia **Ben Rossiter** Victoria Walks **Craig Hoey** Department of State Growth, Tasmania **Craig Wooldridge** Main Roads Western Australia **Marilyn Johnson** Monash University
11:15-11:30am	21-26 **Shane Turner** Abley Limited *Developing Safe System Projects and Programs using Safety Science Methods*	48 **Inam Ahmad** Monash University Accident Research Centre (MUARC) *Findings on child restraint system (CRS) use in Dubai, United Arab Emirates*	37 **Paul Roberts** The University of Western Australia *Impact of a Rural Intersection Active Warning System (RIAWS) on Driver Speed: A Driving Simulator Study*	207 **Michael Chan** Department of Transport *Developing a heavy vehicles safety features roadmap in order to promote safer heavy vehicles beyond the basic legal requirements*		
11:30-11:45am	21-23 **David Silvester** BECA Pty Ltd Melbourne, Victoria *The Effectiveness of the Safer Roads Infrastructure Program Stage 3 (SRIP3)*	238 **George Rechnitzer** Victorian Institute of Forensic Medicine, George Rechnitzer & Associates Pty Ltd, UNSW *The "unseen passenger": current vehicle restraint systems are not designed for safety of pregnant women and their fetus*	40 **Chamila Kariyawasam** Main Roads Western Australia *Road safety gains from small speed reduction wheatbelt roads in rural WA*	180 **Stuart Wade** Transurban *Road Safety Innovation for Heavy Truck Movements Across Structures*		
11:45am-12:00pm	21-22 **Shane Turner** Abley Limited *Improving the Evaluation of Victoria's Road Safety Program*	185 **Paulette Ziekemijjer** Transport Accident Commission *Injury prevention hot-topics: trauma associated with seatbelt non-use and ute occupants*	109 **Teresa Senserrick** CARRS-Q, QUT *Young Novice Drivers' Speed Management: a systematic review*	127 **Venkatesh Balasubramania** IIT Madras *Investigation of Injury patterns in Heavy-duty Single Vehicle crashes based on real-world accident data in Tamilnadu, India*		
12:00-12.15pm	21-24 **Suzanne Walker** GHD Pty Ltd *Safer Roads Black Audio Tactile Linemarking Short Term Evaluation*	223 **Bianca Albanese** Neuroscience Research Australia *Can specific child restraint design features improve correct use?*	182 **Jodi Page-Smith** Transport Accident Commission *Country Driver Behaviour*	202 **Michael Mortimer** Deakin University *Using Virtual Reality to Increase Awareness on Safe Interactions between Light and Heavy Vehicles*		
12:15-12:30pm	101 **Mario Mongiardini** The University of Adelaide *Evaluation of a warning system to reduce the risk of casualty crashes at rural junctions in South Australia*	2147 **Helen Lindner** Mobility and Accessibility for Children in Australia (MACA) *Safety for all: building an evidence base to support safe vehicle transport for children with disabilities and medical conditions*	68 **Donal McGrane** ANCAP *ANCAP Speed Limit Information Function Assessment*	220 **Daniel Brain** Toll Group *Consignors of import containers play a critical role in preventing heavy vehicle rollover, but they're often unaware of their role*		
12:30-12:40pm	Post session networking	Post session networking	Post session networking	Post session networking		
12:40-1.30pm	**Lunch, Exhibition, Poster Gallery**					

	Concurrent Sessions 4					
Topic	**Intelligent transport systems**	**Connected and Automated Vehicles (CAV)**	**Speed 2**	**Safe System**	**Symposium 5**	**Symposium 6**
1:30-1:45pm	104 **Oliver Storey** Transport for New South Wales *A methodological approach to reducing connected vehicle data*	204 **Joanne Vanselow** Department of Transport *Towards Zero CAV Trial Grants Program – identifying road safety actions though public-private collaboration*	21-21 **Lisa Steinmetz** O'Brien Traffic *Implementation and evaluation of Area 40 in Maribyrnong – findings and lessons to date*	192 **Elizabeth Waller** Transurban *Safe system capability development in the context of industry*	**Partnerships Multiply Outcomes - Successes and Opportunities in Local Government and Community Road Safety** **Mayor Matthew Burnett** Gladstone Regional Council (GRC) and Australian Local Government Association (ALGA) Director & Vice President 82 **Michelle McLaughlin** Little Blue Dinosaur Foundation *Little Blue Dinosaur Foundation – Our Story – Prevention through Collaboration with Community Road Safety Stakeholders* 98 **Tracey Norberg** Goulburn Mulwaree Council *Towards Zero, a community approach to helping learner drivers and senior drivers, our vulnerable road users* 52 **Kate McDougall** Eurobodalla Shire Council *Driving Safer Rural Roads – A systematic safe systems review of a local government rural road network* 123 **Joanne Wilson-Ridley** Queanbeyan-Palerang Regional Council *Joe Rider Motorcycle Safety Project - Cross border road safety cooperation and implementation into local government regions*	**Design, the Law and Lego® an interdisciplinary approach to road safety** **NOTE** Virtual delegates: Please bring your Lego® to this Symposium **Robbie Napper** Monash University **Vanessa Johnston** RMIT University
1:45-2.00pm	56 **Kerry Shaz** Transport for NSW *The CITI Connected Light Vehicle Study: Lessons Learnt*	195 **Joanne Vanselow** Department of Transport *Department of Transport and Bosch CAV Highway Pilot Trial on Victorian Rural Roads*	92 **Jamie Mackenzie** The University of Adelaide *A technical review of 40 km/h speed limits in the City of Charles Sturt Local Government Area*	61 **John Gaffney and Elizabeth Hovenden** Department of Transport (Victoria) *Can I Stop? Considering any opportunity to influence the multidisciplinary factors that result in a crash*		
2:00-2.15pm	174 **Toby Cooper** GHD Pty Ltd *Traffic Analysis – AI from a bird's eye view*	194 **Andry Rakotonirainy** CARRS-Q, QUT *Demystifying the Automated Vehicle trolley problem*	245 **Ray Shuey** Strategic Safety Solutions *Speed management in Iran*	226 **Chris Jurewicz** Transport Accident Commission *Safe System Infrastructure Innovation in Victoria's Safer Roads Program*		
2:15-2.30pm	203 **Mohammed Elhenawy** CARRS-Q, QUT *Detecting Road User Mode of Transportation using Deep Learning to Enhance VRU Safety in the C-ITS Environment*	196 **James Soo** Department of Transport *Exploring the safety potential of cellular-V2X based vehicle connectivity, results from the advanced connected vehicles Victoria trial*	80 **Kerkritt Sriroongvikrai** Chulalongkorn University Faculty of Engineering *Impacts of speed limit changes on road safety risks: A cases study of urban streets in Thailand*	201 **Wayne Moon** Road Safety Victoria *A Modernised Safe System Model*		
2:30-2.45pm	114 **Matthew Howe** The University of Adelaide Centre for Automotive Safety Research *What computer vision can tell us about road safety?*	190 **Katie Minogue** Maurice Blackburn Lawyers *When The Rubber Hits The Road - Australia's Motor Accident Injury Insurance Schemes And Autonomous Vehicles*	178 **Mario Mongiardini** The University of Adelaide *Evaluate travel speeds and associated risk of casualty crashes through intersections in Australia using naturalistic driving data*	236 **Sarah Morris** Department of Transport *Safer Roads Program Staged Development Process*		
2:45-3.00pm	152 **Rowena Lamond** Origin Energy *Assessment of CSG Operator driving related transport incidents and impact of implementing IVMS on incident frequency*	197 **Andrew Somers** Omni-Aware *Adapting AV perception for safer roads, results from the Omni-Aware trial project*	215 **Mohammad Mahbub Alam Talukder** Accident Research Institute, BUET *Over Speeding and Road Safety in Bangladesh*	6 **Robert Morgan** Traffic Engineering and Road Safety Consultant *Paradigm Lost – Getting Beyond the Safe System*		
3:00-3:10pm	Post session networking	Post session networking	Post session networking	Post session networking		
3:10-3.30pm	**Afternoon Tea, Exhibition, Poster Gallery**					
3:30-5:30pm	**Plenary 4** **Translating research into practice: workplace road safety** Chair: **Dr Raphael Grzebieta**, Transport & Road Safety Research (TARS) Research Centre, UNSW Victorian Institute of Forensic Medicine, Monash University **Associate Professor Sharon Newnam,** Associate Director, Systems Safety Team, Monash University Accident Research Centre (MUARC) **Mr Jerome Carslake,** Director, National Road Safety Partnership Program (NRSPP) **Mr Daniel Brain,** Load Restraint Specialist, Toll Group **Mr Paul Harrison,** Principal Advisor Work Related Road Safety at Waka Kotahi, New Zealand Transport Agency Followed by a panel discussion between all plenary 4 speakers					
5:30-6:30pm	**AWARDS CEREMONY** Mr Martin Small, ACRS President DPM, TBC Dr Tana Tan, Young Leader Oration 3M Diamond Road Safety Award ACRS Fellow					

	Thursday, 30 September 2021					
9:00-10:30am	**Plenary 5** **Systems thinking for future road safety (Zero by 2050)** **Chair: Mr Carl Muller**, Executive Director, Road Safety Victoria **Professor Paul Salmon**, Director, Centre for Human Factors and Sociotechnical Systems, University of the Sunshine Coast **Dr Brett Hughes**, Principal, P7Safety **Ms Samantha Cockfield**, Head of Road Safety, TAC Followed by a panel discussion between all plenary 5 speakers plus **Mr Martin Small**, President, Australasian College of Road Safety and **Professor Narelle Haworth AM**, Faculty of Health, School of Psychology & Counselling, CARRS-Q					
10:30-11:00am	**Morning tea, Exhibition, Poster Gallery**					
	Concurrent Sessions 5					
Topic	**Health**	**Crash data analysis 3**	**Cyclists and scooters**	**Roads and roadsides**	**Vehicle technology**	**Enforcement and Policing 2**
11:00-11:15am	64 **Roisin Sweeney** Injury Matters *Development of a truck driver public health project: mental and physical safety (MaPS) on our roads*	86 **Giulio Ponte** The University of Adelaide Centre for Automotive and Safety Research *Injury risk and delta-V - insights from event data recorder information and reported injury outcomes*	32 **Anthony Aisenberg** CrowdSpot Pty Ltd *BikeSpot 2020 – Crowd mapping cycling stress across Victoria*	8 **Tana Tan** Safe System Solutions Pty Ltd *Audio-tactile Line-marking and Motorcycle Stability - A Pilot Study*	36 **Giovanni Savino** University of Florence *The acceptance of Autonomous emergency braking system for motorcycles: results before and after testing*	184 **Verity Truelove** University of the Sunshine Coast *A Mixed-Methods Study Examining the Impact of Legal Enforcement on Concealed Phone Use while Driving*
11:15-11:30am	55 **Alyson Elari** Injury Matters *Road trauma support WA: using a public health approach to reduce the long term effects of road trauma*	21-32 **Priyank Trivedi** IITRAM: Institute of Infrastructure Technology Research and Management *Identification of road accidents severity ranking by integrating the Multi-Criteria Decision Making approach*	141 **Jake Olivier** University of New South Wales *Does Biomechanical and Epidemiological Evidence of Bicycle Helmet Effectiveness Translate to a Population?*	81 **Colin Brodie** New Zealand Transport Agency *Understanding the Safety Impacts and Opportunities of New Zealand State Highway Resurfacings and Renewals*	105 **Christine Mulvihill** Monash University Accident Research Centre (MUARC) *Evaluation of a prototype driver distraction human-machine interface warning system*	106 **Michael Timms** NSW Police Force *Safety Testing of Police Motorcycle Jackets*
11:30-11:45am	70 **Siobhan O'Donovan** The University of Adelaide *Cardiac disease and driver fatality*	84 **David McTiernan** ARRB *Safe System Review of Fatal Crashes in the ACT*	177 **Amanda Reynolds** Transport Accident Commission *E-Scooters – are they last mile solution or the last mile health problem?*	118 **David Chircop** Transport for New South Wales *Evaluation of yellow line marking and variable speed limit signs to improve safety in roadwork zones in NSW*	90 **Martin Elsegood** Centre for Automotive Safety Research *Determining the readiness of road line markings for autonomous vehicles through custom video analysis software*	**Speed 3** 3 **Timothy Clark** Transurban *M7 to M2 Pre-congestion Speed Management*
11:45-12:00am	172 **Ying Ru Feng** The University of Western Australia *Changes in Driving Performance after First and Second Eye Cataract Surgery: A Driving Simulator Study*	53 **Asif Hassan** Transport for NSW *Safe Systems Review of Fatal and Serious Injury Crashes in Sydney*	134 **Duc Phan** La Trobe University *Can walking and cycling for train access improve road safety?*	41 **Fritha Argus** Main Roads Western Australia *Automated detection of roadside hazards using Lidar*	218 **Danilo Messias** Department of Transport - Victoria *Developing a marketing strategy to increase Victorians' vehicle safety awareness and influence purchase decisions towards safer vehicles*	21-25 **Tia Gaffney** Australian Road Research Board *Short-term Evaluation of Raised Safety Platforms: A Preliminary Analysis based on Vehicle Speeds*
12:00-12:15pm	214 **Mark King** CARRS-Q, QUT *Injury while drink walking in public places: comparison of patterns associated with vehicle collisions and falls*	21-30 **Masria Mustafa** UITM *Vision Zero for P-Hailing Riders: Understanding Work Demands and Unsafe Work Behaviours*	111 **Amanda Wiltshire** Arup Australia *Complete Streets Victoria: The Cycling Guide*	110 **David Milling** ARRB *Guidelines to provide Roadside Protection for Motorcyclists*	222 **Mahmoud M Masoud** CARRS-Q, QUT *Glare Safety problem in tunnels and underpasses in Australia*	217 **Chris Davis** Mildura Rural City Council *Impact of community reaction on Mildura Council's speed reduction project in residential streets*
12:15-12:30pm	129 **Jacelle Warren** Jamieson Trauma Institute, Metro North Health *The risk and cost of pelvic and lower limb fractures from road transport crashes: Motorcyclists are key*	175 **Raaj Kishore Biswas** University of New South Wales *Definitions and associated factors of headway: a systematic review of passenger vehicle studies*	234 **Phil Gray** State Government of Victoria *Identifying Cycling Stress to Inform Cycling Infrastructure Investment*	243 **Mansour Ranjbar Kahkha** World Health Organization *Demonstrating enhanced Safety Model Corridors in Iran*	131 **Paolo Terranova** Virginia Polytechnic Institute and State University *Motorcycle Active Safety Systems: A cross-national comparison of applicability in the Australian, Italian, and US fleets*	227 Sovann Kong *Enhancing road safety knowledge and practice around rural school zone in Cambodia*
12:30-12:40pm	Post session networking	Post session networking	Post session networking	Post session networking	Post session networking	Post session networking
12:40-1:30pm	**Lunch, Exhibition, Poster Gallery**					

	Concurrent Sessions 6					
Topic	**Road design and the built environment**	**Mobile phones**	**Impairment – alcohol and drugs**	**Intersections**	**Community and Local Government**	**Symposium 7**
1:30-1:45pm	73 **Callum Hooper** Arup *The urban road and street design guide*	21 **John Willoughby** Transport for New South Wales *Developing a world-first mobile phone detection camera program in NSW: from no known solution, to operational program in two years*	31 **Anne Harris** Anne Harris Consulting *Effectiveness of drink driving countermeasures in Australia: a national policy framework*	93 **Julianna Bodzan** Transport for New South Wales *Identifying high-risk intersections by modelling driving behaviour with machine learning methodologies*	213 **Jay Baththana** Abley Limited *Using community feedback to complement road safety risk metrics*	**Creating the business case for a true system for organisations through safety, environment and efficiency** **Jerome Carslake** National Road Safety Partnership Program (NRSPP) Lee Sauerwald Uniting Communities Guy Pritchard Sustainability Victoria
1:45-2.00pm	264 **Ubaid Quraishi** Department of Transport (Victoria) *Audio Tactile - Mass Action Development and Delivery*	137 **Ian Faulks** CARRS-Q, QUT *Snap-chat – Mobile phone camera enforcement and community attitudes*	59 **Louise Higgins-Whitton** Transport for NSW *Development and implementation of New South Wales Drink and Drug Driving Reforms*	15 **Elizabeth Lee** State Government of Victoria *Pedestrian occupancy detection (POD) using an optical system at traffic signals*	216 **Mrinmoy Samadder** BRAC University *Examining 'Group Dynamics': Involving community people towards safer roads*	
2:00-2.15pm	14 **James Thompson** The University of Adelaide Centre for Automotive Safety Research *An evaluation of retro-reflective screens to aid conspicuity of trains at passive level crossings at night*	96 **Lisa Wundersitz** The University of Adelaide Centre for Automotive and Safety Research *Uncovering driver distraction and inattention in fatal and injury crashes*	46 **Rhiannon Kelly** Transport for NSW *Drink driving attitudes and behaviours in NSW* 63	235 **Sarah Morris** Department of Transport *Raised Intersections at Traffic Signals in Victoria*	44 **Kate McDougall** Eurobodalla Shire Council *Local Government supporting and reinforcing workers returning home safely: case study of John Holland - Batemans Bay Bridge replacement project*	
2:15-2.30pm	133 **Mel Taylor** Macquarie University *Floodwater on Roads: Driver behaviour and decision-making*	188 **Joel Tucker** RACQ *Set Your Phone Then Leave It Alone – An anti-distraction campaign*	**Max Cameron** Monash University Accident Research Centre (MUARC) *Modelling the crash effects of random and targeted roadside drug tests in Victoria, particularly on drug driving involving methylamphetamine*	210 **Joanne Vanselow** Department Of Transport *Using LIDAR data for analysing road safety at an intersection – evaluation of the Omni-Aware dataset for road safety research*	69 **Teresa Williams** Road Safety Commission *Community Engagement and Attitudes for Road Safety in Western Australia*	
2:30-2:45pm	231 **Mark Keulen, Henri Sutton and Chantelle Elsley** Transport for NSW *The Mitchell Highway Safer Asset Cross-Section Pilot Project*	88 **Will Warner** Transport for New South Wales *Modelling the Potential Road Trauma Reductions of Mobile Phone Detection Cameras in NSW*	122 **Matthew Baldock** The University of Adelaide Centre for Automotive Safety Research *Characteristics of crash-involved drink and drug drivers and motorcyclists*		62 **Tegan Pearce** Department of State Growth *Mentoring to increase compliance and road safety*	35 **John Gaffney / Elizabeth Hovenden** State Government of Victoria *Towards Linking Climate Phenomena to Road Safety Outcome*
2:45-2:55pm	Post session networking	Post session networking	Post session networking	Post session networking	Post session networking	Post session networking
2:45:3:15pm	**Afternoon Tea, Exhibition, Poster Gallery**					
3:15-4:00pm	Chair: **Dr Jeff Potter**, Principal Policy Advisor, National Transport Commission **Conference wrap up** **Presentation of conference awards** **Invitation to ARSC2022**					

Extended Abstract Number	Author(s)	Topic	Title	Abstract
3	Clark, T. Gray, S.	Road Environment (ITS - roads) Intelligent Transport Systems in Road Infrastructure	M7 to M2 Pre-congestion speed management	This paper explores the development and implementation of the M7 to M2 Pre-congestion Speed Management trial. This trial was the first of its kind in NSW and will allow motorway operators and road authorities the opportunity to understand the safety and reliability benefits that proactive speed management may bring to Sydney's motorway networks
6	Morgan, R.	Policy Development And Implementation Road Safety Strategy	Paradigm lost – getting beyond the safe system	Every new road safety paradigm is ultimately counter-productive, because it becomes dogma. The *Safe System* and strategies based on it, like *Towards Zero* have repeated this truism. Zero is not possible. Pursing it has involved a return to pre-scientific notions of road safety 'solutions' that are ineffective. For example, the 'primacy of speed management' in all Australian road safety strategies has resulted in excessive use of low speed limits – an example of trying to directly modify road user behaviour. The Safe System's core (the body's tolerance to crash forces) is useful, but is only half the story. The other half is the mind's tolerance to complexity and excessive, wrong or misleading information. The author has developed an alternative evidence-based strategic framework. It seeks to avoid dogma. It incorporates the need to understand human behaviour, rather than fight against it. This alternative is the *Safety Star System*. Details are included.
7	Poynton, J. Burtt, D.	Road Safety Audit and Road Safety Review Bicyclists Pedestrians Safer Mobility	A safe access audit tool for active transport	Safe System Solutions Pty Ltd and Victoria Walks worked in partnership to develop a comprehensive auditing and decision support tool on behalf of Banyule City Council. Banyule require the tool to enable them to conduct in-house safe access audits of some of their activity centres in relation to pedestrians, cyclists and mobility scooter users. The tool itself consists of four modules providing 1) criteria checklist, 2) report template for site visits, 3) strategic overview template, 4) a template for recording final decisions.
8	Tan, T. Le, J. Beer, K. Poynton, J. Sherry, D.	Road Furniture (Poles, Signs, Etc) Road Design Motorcyclists Scooters	Audio-tactile Line-marking and perceived motorcycle stability	Audio-Tactile Line-Markings (ATLM) are a road safety feature designed to alert vehicle drivers and avoid lane departures by creating a haptic and audible vibration. There have been concerns by motorcyclists that ATLM could negatively affect the stability of motorcycles. This study qualitatively assesses whether ALTM negatively affect motorcycle stability. Three ATLM configurations were installed and 10 participants were recruited to ride over the ATLM and provide feedback through surveys. The results from the survey analysis indicates that the participants' perception of ATLMs as a potential cause of motorcycle instability had decreased.

14 (also Full Paper)	Thompson, J. Baldock, M. Stokes, C.	Hazard Perception Road Environment Crossings (Pedestrian, School, Rail, Rural/Animal)	An evaluation of retro-reflective screens to aid conspicuity of trains at passive-control level crossings at night	Trains already passing through level crossings in rural areas at night can be difficult for approaching motorists to see. Crashes can occur if the crossing has 'passive' controls (Give way/Stop signs) and motorists fail to stop. Retro-reflective screens on the far side of the crossing to motorists that reflect headlights and produce a 'strobing' effect between carriages could increase train conspicuity. A prototype screen was applied to a crossing in South Australia. Four videos of trains at night from the perspective of an approaching vehicle (conditions: high versus low beam headlights, screen versus no screen) were recorded and used in a reaction time experiment with N=29 drivers. With high beams, the screen led to shorter reaction times, which suggests it increased train visibility. With low beams, it led to longer reaction times, which suggests it reduced train visibility or confused drivers. Implications, study limitations and further experimental testing are discussed. (Also see: https://doi.org/10.33492/JRS-D-21-00007)
15	Lee, E. Fitts, A.	Intersections and Roundabouts Crossings (Pedestrian, School, Rail, Rural/Animal) (ITS - roads) Intelligent Transport Systems in Road Infrastructure	Pedestrian occupancy detection (POD) using an optical system at traffic signals	The Department of Transport has approximately 3350 traffic signal intersection in Victoria where around 1500 are Pedestrian Operated Signal (POS) and 325 are Pedestrian User Friendly Intelligent (PUFFIN) crossings using overhead radar detectors to optimise the pedestrian signal settings. The PUFFIN detectors are used to detect all pedestrians crossing the carriageway. The output is used by the traffic signal controller to extend the walk and/or clearance times while a pedestrian is on the crossing. However, there is no information on how many pedestrians and cyclists are waiting to cross. The testing of POD using an Optical system can be used to detect and monitor the volumetric data in the form of pedestrian occupancy ratio in a predetermined area. The main feature is the occupancy mode which allows traffic signal operation to be dynamically adjusted dependent on the volume of people waiting to cross. This is ideal for sites which have varying influx of people using the crossing e.g. school.
16	Bates, L. Seccombe, J.	Young Drivers Novice Driver/Rider Licensing General Enforcement	The effect of parenting styles and differing theoretical frameworks on young drivers self-reported compliance	New drivers are a high risk group for traffic offences. With traditional deterrence appearing to have a more limited impact on young drivers, effective alternatives are needed. The purpose of this study was to identify if parenting style influenced self-reported offending after considering different types of theoretical frameworks. An online vignette study was completed by 1,673 participants who held a provisional (Queensland) or probationary (Victoria) licence. The scenarios were based on deterrence, procedural justice, and third party policing frameworks. In addition to a general decrease in offending, participants that reported having parents that were higher in control indicated that they were less likely to offend when exposed to the third party policing scenario. These results indicate that third party policing has potential to improve compliance rates for young drivers and that it is important to consider parenting style when introducing initiatives designed to increase young driver compliance.

17 (also Full Paper)	Cameron, M. Newstead, S.	Road Safety Strategy Speed Cameras	Increasing the effectiveness of mobile speed cameras on rural roads in Victoria based on crash reductions from operations in Queensland	Mobile speed cameras on Victoria's rural roads are not as effective as they could be due to the site selection criteria, the limited number of sites, and the visibility and predictability of their enforcement operations. Queensland's overt mobile speed cameras achieve substantial crash reductions up to 4 km from rural camera sites due to site selection based only on crash history and randomised scheduling of operations to those sites. New sites in Victoria should be selected as in Queensland and camera visits should be randomly-scheduled. The Victorian Government's announcement to increase mobile speed camera hours by 75% should take the form of at least 75% increase of rural sites. The new sites should be selected on the basis of a serious crash history within 2.5 km. Mobile speed cameras operated at these new rural sites could be expected to save 22.5 fatal crashes and 172 serious injury crashes per year. (Also see: https://doi.org/10.33492/JRS-D-20-00273)
19	Hydon, C. Marko, Z.	Community Programs Road Safety Programs Early Childhood Road Safety Education – general and other	Active and safe: young children as engaged road users in their communities	Starting Out Safely is an early childhood road safety education (RSE) program focused on children, parents, and educators working together to guide children's learning and becoming safe and independent road users. Funded by the Victorian Government, the program has been developed in collaboration with leading experts through evidence-based research and best-practice principles. A 2019 Inquiry Project was undertaken to challenge educators to abandon views of RSE as one-off curriculum episodes and work locally with children to understand road safety issues and make positive change. Participants were encouraged to use RSE as a community engagement mechanism to enable children to realise their full potential as citizens. The project findings will be shared with a view to motivate early childhood services to contribute to the Towards Zero initiatives. Examples showcase how RSE can be embedded into curriculum to create safer communities for everyone.
20	Hardiman, J. Hardiman, M. Hay, R. MacFarlane, M. Redwood, P. Sycz, D. Walker, L.	Crash Investigation – including investigation methods & technology Crash Reconstruction – including computer simulation Statistical, Epidemiology and Other Road Safety Research Methods	Comparison of skidding vehicle drag factors on various surfaces	In 2018, there were 1,146 deaths on Australian roads with vehicle speed estimated to be a direct factor in 30% of all road accidents. (Bitre, 2019) Collisions are analysed to determine causation including driver behavior, speed, vehicle safety and road design. Vehicle speed analysis relies heavily on the determination of the drag factor at any collision scene. Test skids at the collision site are regarded as the most reliable method to determine drag factor. The use of published drag factor tables has been criticised as the results are not case specific. Since 2002, Victoria Police (VP) have performed over 1275 test skids on Victorian Roads. Tests have been performed on various surfaces with and without anti-lock braking (ABS) producing results consistent with published worldwide data sets. Results support the use of published data sets for speed determination when test skids cannot reasonably be conducted at the collision site.

21	Willoughby, J. Carlon, B. Cavallo, A. Hayes, P. Gavin, A. Higgins-Whitton, L. Jansen, A. Legg, S. Lewandowski, V. McCaffery, T. Murdoch, C. Newstead, S. Sakar, S. Stephan, K. Stephens, A. Thompson, J. Wall, J.P. Warner, W.	Speed Cameras Enforcement Programs Enforcement Technologies Penalty Systems	Developing a world-first mobile phone detection camera program in NSW: from no known solution, to operational program in two years	In NSW since 2012, there have been over 182 casualty crashes involving a driver using a hand held mobile phone – resulting in at least 13 deaths and 243 injuries. The true number is likely much higher due to under reporting. In less than two years Transport for New South Wales (TfNSW) turned an idea for tackling illegal hand held phone use while driving into a world-first road safety initiative. Seeking a fresh approach, the NSW Government stimulated the market to develop a solution by creating the legal framework for camera detected offences using established principles from speed enforcement. A pilot proved that the camera system could reliably detect illegal mobile phone use and informed the design of an end-to-end operating model. The NSW Mobile Phone Detection Camera program became operational in December 2019 and is expected to save around 100 fatal and serious injury crashes over five years.
23 (Poster)	Felsch, J.A. Sutton, P. Attard, A. Ditton, A. McMenamin, P.	Driver Risk Older Drivers & Road Users Hazard Perception Education – general and other	Caravan Safety Awareness Project in northern NSW	Caravanning is more popular than ever in Australia. There are now nearly 154,400 caravans registered in NSW with caravan registrations rising 53% in the 7 years to 2019. In NSW, over the same period, there were a total of 2,318 crashes involving caravans/ trailers, of which 19.1% were serious injury or fatal crashes. To engage caravanners, industry associations, caravan clubs, caravan safety educators and improve caravan safety awareness in Northern Region, Transport for NSW (TfNSW) has collaborated with NSW Police Highway Patrol. TfNSW has delivered engagement activities in northern region and the Centre for Road Safety has developed a caravan safety webpage and collateral for statewide use. Other regions in NSW, also noticing caravan safety concerns, are keen to learn from our findings and implement our initiatives
24	Soole, D. Anderson, W. Smith, T.	Driver Risk Enforcement Technologies Speed Cameras Speed, Speeding & Travel Speeds	The attribution of casualty crashes to low-level speeding in Queensland	The positive relationship between vehicle speeds and crash risk and severity are well understood. This paper sought to utilise speed probe data and existing crash risk estimates to determine the proportion of crashes attributable to various speeds above the posted limit on Queensland roads, with a particular focus on low-level speeding (1-10 km/h above the limit). The findings demonstrated that the majority of speeding motorists were engaged in low-level speeding. Analyses indicated that between 5.9% and 19.2% of all casualty crashes were estimated to be attributable to low-level speeding, with proportions typically higher in lower speed limit zones. Conversely, it was estimated that between 19.9% and 67.0% of speed-related crashes were attributable to low-level speeding, with proportions typically greater in higher speed limit zones. Further data analyses stratified a range of spatial and temporal variables. Policy implications of the findings are discussed.

25	Symmons, G. Simpson, P.	Community Programs Driver Psychology Road User Training – General (Bicyclists, Workplace, OHS, Etc.) Young Drivers	LET'S #GOSAFELY - A community-based multi stakeholder approach to road safety education for young adult road users	Since 2014, the Fit to Drive Foundation's F2D Year 11 (F2D) Workshop, a community-based road safety intervention, has reached more than 120,000 students throughout Victoria. The F2D Program is delivered by trained youth as facilitators and ambassadors to empower young people to talk about making good decisions on the road and be safer road users. The F2D Program integrates research, program logic development and delivery and evaluation in a multi stakeholder approach to road safety education for young adult road users that is local, community-based and long term. The paper will explore the effectiveness of the F2D Program in reducing road trauma in the community. Participant feedback from students and teachers is continuously measured and insights gained evolve the program, resulting in a contemporary and positive approach to community-based road safety education for all stakeholders. This paper will share these learnings.
28	Hassan, A. Reardon, N. Mungkung, M.	Crash Data Analysis Pedestrians	A structural equation model for pedestrian crashes in sydney	Over the five year period between 1 January 2014 and 31 December 2018, pedestrians were killed more than any other road user in Sydney, making up around 40% of the road fatalities in Sydney, New South Wales (NSW) and the trend is consistent in every year over the five year period. In this paper a structural equation model is proposed to identify factors impacting pedestrian crash severity in Sydney. Impact of road characteristics, environmental factors, driver characteristics, and pedestrian characteristics were analysed to identify their impact on crash severity. Numerous iterations were conducted to achieve statistically significant and a good-fit model. Using this, countermeasures were proposed to address these crashes, particularly fatal and serious injury crashes, across the Safe System pillars.
31	Banyer, G. Howard, E. Harris, A. Murdoch, C. Graham, R. Higgins-Whitton, L.	Drink Driving Driver Risk General Enforcement Policy Development And Implementation	Effectiveness of drink driving countermeasures in Australia: a national policy framework	Drink driving is a persistent problem and remains one of the leading causes of death and trauma on Australian roads. This project collates statistics of alcohol-related trauma over a three year period (2015-2017) across Australian jurisdictions, and reports the differing legislation, penalty and enforcement practices across Australia. By building a picture of the trauma and understanding the different starting points of each jurisdiction, this Austroads project delivers a national policy framework that brings together current and potential countermeasures to reduce this trauma and work towards eliminating drink driving deaths and serious injuries. A staged approach to the implementation of evidence-based solutions is offered for use by different jurisdictions as appropriate. Strong empirical evidence is provided for countermeasures including for lowering the legal BAC limit for all drivers, improved deterrence through highly visible and randomised enforcement and working more closely with alcohol and other drug sectors to manage alcohol dependent drivers.

32	Aisenberg, A.	Advocacy Bicyclists Communication and Media Statistical, Epidemiology and Other Road Safety Research Methods	BikeSpot 2020 – Crowd mapping cycling stress across Victoria	Concerns about safety and crash risk, both real and perceived, are the most important determinants of whether people cycle. Cycling stress (particularly in traffic) is instrumental in influencing the choice to ride. If a single section of a route is perceived to be highly stressful, many people, particularly new riders, will likely decide not to ride. BikeSpot 2020, a collaboration between CrowdSpot and the Amy Gillet Foundation, is a project that maps the safety concerns and level of cycling stress experienced by cyclists across Victoria. Outcomes from this project will help inform partnering local and state government agencies on specific locations that have relatively high level of traffic stress and how to maximise the return on the investment into infrastructure for safe cycling.
34 (Poster)	Ibrahim, M. Logan, D. Koppel, S. Fildes, B.	Driver Risk Safer Mobility Safer Transport & Mobility	Using relative risk of different travel options as part of journey planning attributes – case study from Victoria-Australia	Demand for journey planning systems that generate different options is increasing to help people get to places more efficiently by providing information on time, cost and emissions that aim to ease congestion and encourage more sustainable travel. The aim of this study was to add travel risk as an element into encouraging safer travel behaviour in addition to the other attributes. By using injury and travel data in the Australian state of Victoria between 2012 and 2016, this study estimated the fatal and serious injury (FSI) rates per travel distance across nine travel modes. These rates were then applied to a real-world case to illustrate how safety can also be calculated in the form of relative risk between different available options as part of the modal choice process.
35	Gaffney, J. Hovenden, E.	Road Environment Safer Transport & Mobility Education – general and other Crash Data Analysis	Towards linking climate phenomena to road safety outcome	Climate and its many weather manifestations can explain the significant variations in Victoria's annual road fatalities. This paper illustrates how climate phenomena and weather metrics can increase crash risk, identifies the need for intervention during certain weather events and provides pathways for further research. There is a linkage between fatalities and key meteorological climate drivers (macro-metrics) and their daily weather manifestations (micro-metrics). The key climate drivers for Victoria and south eastern Australia produce complex interactions forming long-term weather patterns influencing the occurrence of fatal crashes. Analysis of Victorian crash records has found that weather is a significant factor involved at least 10% of fatalities. Understanding how climate influences crash occurrence can provide an understanding of the variations seen in fatalities over the past 30 years. Research in this area can be used to develop appropriate strategies to improve road safety and help reach the target of zero deaths.

36	Cosimo Lucci, MSc Savino, G. Baldanzini, N. Pierini, M.	Autonomous Vehicles Crash Avoidance and Crash Severity Reduction Motorcyclists Scooters	The acceptance of Autonomous emergency braking system for motorcycles: results before and after testing	Autonomous Emergency Braking (AEB) is a promising technology in the future of motorcycle safety, since it could be effective in reducing the consequences of crashes. To evaluate whether a personal experience of the intervention may influence the acceptance of such a system, an analysis of the results of a field study conducted in realistic pre-crash manoeuvres and involving 31 participants was carried out. Among users who applied for volunteering in field tests with motorcycle safety systems, the pre-test acceptability of AEB was generally lower compared to that of safety system already installed on standard vehicles. After field-testing automatic braking interventions, the participants' opinion about the potential effectiveness and reliability of the system was more positive; none of the participants considered the system damaging anymore. Field testing motorcycle autonomous emergency braking in realistic pre-crash manoeuvres turned out to have a positive influence on the acceptability of the system among our participants.
37	Roberts, P. Meuleners, L.B. Fraser, M.L.	(ITS - roads) Intelligent Transport Systems in Road Infrastructure Driver Risk Hazard Perception Speed, Speeding & Travel Speeds	Impact of a rural intersection active warning system (RIAWS) on driver speed: a driving simulator study	Rural Intersection Active Warning Systems (RIAWS) are an innovative road safety treatment designed to slow traffic on major approaches to a high-risk rural intersection when vehicles are turning or crossing into or out of the side roads, thus reducing fatal and serious casualties. A 2x2 experimental driving simulation study was undertaken which aimed to determine the impact of signage (RIAWS versus traditional painted) and sign content (80km/h versus slow down) on drivers' instantaneous speed at rural intersections. The RIAWS "80km/h" sign resulted in significantly lower instantaneous speeds than all other types of signs including RIAWS "slow down" signs ($p<0.001$), traditional painted "80km/h" signs ($p<.05$) and traditional painted "slow down" signs ($p<.01$). Overall, the study found that RIAWS "80km/h" sign and not the RIAWS "slow down" sign provided the most effective option for reducing driver speeds on approach to rural intersections.
39	Larue, G.S. Watling, C.N. Black, A.A. Wood, J.M.	Crossings (Pedestrian, School, Rail, Rural/Animal) Distraction & Inattention Pedestrians Signage & Signalisation	Increasing awareness of distracted pedestrians at railway level crossings with illuminated in-ground lights	Pedestrian distraction is a growing problem. Current signage at railway level crossings may not be effective for pedestrians distracted by mobile devices, as it is designed for users looking ahead when walking rather than looking downwards as when using a mobile. Illuminated in-ground lights are an innovative solution to address this issue but have not been evaluated for use with distracted pedestrians. We conducted a 2 (in-ground lights yes/no) x 3 (distraction task none/auditory/visual) repeated measures field study (N=34) at a railway level crossing to assess whether distracted pedestrians could detect illuminated in-ground lights and how this impacted on visual scanning behaviour. Pedestrians detected the lights as accurately when distracted (visually or auditorily) compared to when not distracted, and eye scanning behaviour of the rail tracks with the in-ground lights was the same as for non-distracted levels. This is the first study to suggest that illuminated in-ground lights could be effective in attracting the attention of distracted pedestrians at railway level crossings.

40	Kariyawasam, C.	Road Safety Strategy	Road safety gains from small speed reduction wheatbelt road in rural WA	Safe roads and roadsides, safe Speeds, safe vehicles and safe people are cornerstones of the road safety system (Cairney, Imberger, Turner, 2013). When providing safe roads and roadsides, road geometry is a vital factor, in assessing the suitable speeds that most vehicles operate on the road (Semeida, 2013). For low volume, rural roads with substantial substandard geometry compared to the posted speed, geometric improvements are not justified due to the high cost. A better approach would be speed management. This case study focuses on the Chidlow York Road, a 44km long regional, freight, tourist and inter-town route in the Main Roads Wheatbelt Region of Western Australia. This road is known for its poor geometry; 110km/h posted speed and carries around 2000 vehicles daily. Reducing the speed limit by 10km/h to 100km/hr along with minor improvements, a crash reduction of 34% was observed (IRIS database, 2019).
41	Argus, F.	IRAP, AusRAP, etc.	Automated detection of roadside hazards using Lidar	Main Roads Western Australia undertook development of AusRAP star rating using existing corporate inventory data to meet reporting commitments to the National Road Safety Strategy. Throughout this work, both the advantages and limitations for using inventory data were highlighted. One such issue is with detection and identification of roadside hazards (e.g. trees, power poles, buildings). Therefore, Main Roads has partnered with Anditi to test the potential for automating the detection of road and roadside features using mobile Lidar and 360° imagery data. Two thousand kilometers of state road network have been selected, broken into five categories with differing roadside archetypes. Analysis conducted can detect and identify various roadside hazards, and even differentiate between tree trunks and power poles. This fresh innovative approach to data sourcing for safety risk assessment has real potential and may ultimately help towards the development of up-and-coming tools such as αi-RAP.
42 (Poster)	Argus, F.	IRAP, AusRAP, etc.	Using road inventory data to produce AusRAP star ratings	Actions 2 and 3 of the National Road Safety Action Plan 2018-2020[1] collectively aim to reduce risk associated with infrastructure by setting targets for the proportion of travel on state and national routes with 3-star (or better) AusRAP star ratings. In order for Main Roads Western Australia to determine how the state is progressing towards these targets, it first needed to rate the network using AusRAP. As funding for video coding was unavailable, an AusRAP upload file was developed using existing corporate inventory data. This project established business and coding rules to convert inventory data into AusRAP fields. This has enabled the entire state road network to be AusRAP star rated at a fraction of the cost of video coding.

43	Assi, G.S.	Driver Psychology Young Drivers	Self perception, driving patterns and gender differences on psychological measures of young Indian drivers	A study of 395 young Indian drivers (199 males and 196 females) exploring their socio-demographic profile along with gender differences was conducted. Differences among male and female drivers on several parameters were sought. This study provides an insight into what sets male and female drivers apart on their driving license patterns, perceptions of their own self on being aggressive, risk-taking or an unsafe driver. The socio-demographic profile looked into their driving license and driving test parameters. Psychological constructs of driving anger and dangerous driving were administered to the participants. The findings reveal that there were significant gender differences on sub-scales of driving anger, where females were found to experience anger on the hostile gestures of other drivers on roads. Significant gender differences on the sub-scales of dangerous driving was also found where males were found to score higher on dimensions of aggressive and risky driving than their female counterparts.
44	McDougall, K. Pritchard, J.	Fatigue Workplace and Work Related Road Safety Road Safety Programs Education – general and other	Local government supporting and reinforcing workers returning home safely: case study of John Holland–Batemans Bay bridge replacement project	Eurobodalla Shire Council (ESC) collaborated with construction company John Holland's Batemans Bay Bridge replacement project team, implementing Towards Zero "Road Safety and Your Work; a Guide for Employers"(1) (TZRSAYW). After assessing road safety risks within the John Holland workforce, driver fatigue was targeted as 55% of project workers live outside the Eurobodalla and travel home regularly. Driver fatigue in Eurobodalla accounts for 23% fatal and 11% casualty crashes 2014 to 2018. Due to unprecedented bush fires in 2019-2020 in Eurobodalla, additional Towards Zero messages where delivered to ensure the safety of workers travelling home from the workplace, particularly on weekends and peak holiday times.
45	Hardiman, M.	Speed, Speeding & Travel Speeds Autonomous Vehicles Legislation and Law Crash Investigation – including investigation methods & technology	Real world application of crash data from vehicle event data recorders - a case study	The use of crash data obtained from Event Data Recorders (EDRs) has grown significantly since their introduction in 1997 and is now considered an integral element of collision reconstruction. EDR data has been accepted in criminal cases in the USA, England and Australia (Technavio, 2017), with Victoria Police (VP) presenting crash data in criminal matters since 2010. The use of this data has provided corroboration of existing reconstruction methods and previously unknown information where there is no physical scene evidence. In this case, two vehicles, both equipped with EDRs were involved in a collision at a signalized intersection, resulting in the death of two occupants in one vehicle. The data obtained from the EDR was shown to be highly accurate and robust, leading to a successful prosecution. The devasting loss of life in the high-speed collision detailed in the case study highlights the true value of the information obtained from EDRs.

46	Kelly, R. Rath, N. Guyader, F. Elliot, D. Filardo, L. Fernandes, R. Higgins-Whitton, L.	Drink Driving	Drink driving attitudes and behaviours in NSW	Drink driving remains problematic in NSW, contributing to 17% of road fatalities in 2019. A sample of 2,133 NSW drivers was surveyed regarding their attitudes and behaviours towards drink driving. Twenty-five per cent had driven over the legal blood alcohol concentration (BAC) limit in the last six months, up from 18% in 2014. Prevalence of drink driving was higher for those aged 16-25, especially for regional-based females (50%). Drink drivers were more likely to endorse driving over the legal BAC limit in certain situations such as driving on quiet roads or short distances and were less likely to think they would get caught. However they were more likely to be aware of new drink driving penalties introduced in 2018-19, and to say these would deter them from drink driving. NSW drink driving campaigns are currently being reviewed with the aim of incorporating these findings into future education and awareness campaigns.
48	Ahmad, I.F. Fildes, B. Logan, D.B. Koppel, S.	Restraints Child Restraints Legislation and Law Road Safety Programs	Findings on child restraint system (CRS) use in Dubai, United Arab Emirates	This study aimed to investigate parents' attitudes, knowledge and behaviours relating to safe child occupant travel in the Emirate of Dubai in the United Arab Emirates (UAE). A survey was conducted with 815 parents/carers who were responsible for 1,694 children (aged between birth and 10 years) to investigate their use of child restraint systems (CRS) and booster seats for their children, their self-reported use of appropriate restraints for their child's age-group, issues regarding restraint selection and installation, and knowledge regarding the restraint legislation. Overall, 20.6 percent of participants reported that they 'never' used a CRS and booster seat for their eldest child who was aged 10 years or younger while travelling in a motor vehicle. In addition, the proportion of eldest children who were 'never' restrained increased with their age. Future research will validate this self-reported child restraint use data with objective data from observations of real-world child restraint use behaviour in UAE.
49	Doukouris, K. Beer, K.	Education – general and other	Road safety capability requirements for road authorities	The Safe System road safety philosophy requires roads to be designed and managed so that death and serious injury are avoidable. The basic principles are: a. Humans are fallible and will inevitably make mistakes. b. Despite this, road trauma is not inevitable. c. To prevent trauma, the road system must be forgiving. Successful road safety requires staff with the appropriate skills in the Safe System (capability), and sufficient numbers of staff to effect noticeable changes (capacity). Capability development training for lead road safety authorities in Australia, New Zealand and South-East Asia, enabled us to identify those capability areas that need to be strengthened or are particularly effective. This depends on the career phase of the practitioner as well as the particular concerns of their jurisdiction. For example, motorcycle safety is particularly problematic, especially in the Asian region where motorcycles are the predominant mechanised transport mode.

51	Molloy, O. Molesworth, B. Williamson, A.	Speed, Speeding & Travel Speeds Young Drivers Driver/Rider Training Road User Training – General (Bicyclists, Workplace, OHS, Etc.)	The impact of the medium in which feedback is presented on young drivers' speed management behaviour	The aim of the present research is to examine the effect of the medium in which feedback is delivered (verbal, written, graphical) on young drivers' speed management behaviour in a 60km/h speed zone, immediately post-training and one week post-training. Sixty young drivers, randomly allocated to one of four feedback groups (i.e., Control, Verbal feedback, Written feedback, and Graphical feedback) completed one training and two test drives using an instrumented vehicle. The results showed that feedback presented graphically was most effective in reducing the mean speed travelled in the 60km/h speed zone. These effects were present immediately following training as well as one week later. These findings have important implications for the development of a new approach to improve young drivers' speed management behaviour.
52	McDougall, K. Dunn, A.	Road Safety Audit and Road Safety Review Road Safety Strategy	Driving safer rural roads – a systematic safe system review of a local government rural road network	Eurobodalla Shire Council (ESC) is working towards achieving zero deaths on their local road network through commitment of safe system approachs including building network capacity and implementing safety improvements. In 2019, ESC select road management staff inspected all 280km of rural and regional sealed roads, systematically documenting 911 identified road safety issues. The resultant Road Safety Review integrated into the Eurobodalla Road Safety Plan 2019-2021 (RSP) ensures ESC's whole of network and route approach targets high priority actions addressing funding of hazard elimination, prioritizing road maintenance, while promoting ESC staff to train others in identifying and reporting hazards.
53	Hassan, A. Reardon, N. Nguyen, T. Mungkung, M.	Road Environment Crash Data Analysis	Safe systems review of fatal and serious injury crashes in sydney	The Safe System approach involves different elements of the system working together to help eliminate fatality and serious injury. This study reviewed 14,064 fatal and serious injury (FSI) crashes that occurred in Sydney during the five year period from 1 January 2014 to 31 December 2018. The analysis was conducted using descriptive analysis and the chi-square test. The review identified common FSI crash factors across Safe System pillars (roads, speed, vehicles, people) based on crash data. Results showed that road surface condition, type of location, speeding, age of pedestrian, and license status were the common factors that affected the FSI outcomes.

55	Smith, C. Wold, C.	Driver Psychology Education – general and other Post Crash Rehabilitation	Road trauma support WA: using a public health approach to reduce the long term effects of road trauma	Injury Matters provides Road Trauma Support WA (RTS WA), a state-wide service assisting anyone affected by road trauma, regardless of when the incident occurred, or the person's level of involvement. The purpose of this project is to share evaluation findings of applying a public health approach to RTS WA and to inform the service to meet the need of people impacted by road trauma. In 2018, a comprehensive evaluation framework was developed and implemented to show the impact of the service. The annual survey findings indicated 78.73% (n=37) of counselling clients incorporated topics that were discussed into their everyday life. Whilst service users have engaged with RTS WA for a specified road incident, the service often identifies complexities and underlying mental health concerns. This is addressed through a public health approach to support prevention strategies, as well as intervention strategies for those impacted by road trauma.
56	Chevalier, A. Ledger, S.A. Shaz, K Wright, C. Wall, J. McCaffery, T.	Driver Psychology (ITS - vehicles) Intelligent Transport Systems in Vehicles Statistical, Epidemiology and Other Road Safety Research Methods	The CITI connected light vehicle study: lessons learnt	The Cooperative Intelligent Transport Initiative (CITI) aims to investigate the safety benefits, acceptance, and issues surrounding deployment of cooperative intelligent transport systems (C-ITS). As part of CITI, members of the public consented to participating in a field operational test (FOT) which involved fitting C-ITS technology to their light vehicle for approximately 10 months. Members of the research team provided input on lessons learnt from the FOT which were summarised into issues, future actions, and what was done well. Strengths of the FOT related to achieving the aim to capture findings to inform considerations about wider roll out of C-ITS. Other strengths related to the training and equipment installation and maintenance processes. Known limitations of the FOT included the sample size being insufficient to investigate the safety benefits of C-ITS. Suggestions to address this included a trial with a larger participant sample size, and increasing the amount and types of equipped infrastructure and alerts. Key lessons learnt relate to improvements to the human-machine interface, technology configuration, and data capture. It is envisaged these lessons will assist developers and researchers undertaking trials of similar technologies.
57 (Poster)	Cohen, R.A. Rowe, D. Everingham, S. Graham, R. Parnell, H.	Workplace and Work Related Road Safety Fleet Safety Community Programs Road Safety Programs	The next frontier: Road safety in the workplace	In NSW, around one in three workplace fatalities occur while driving or riding for work. It is the number one cause of death in the workplace and for many employers it is their greatest workplace risk. Under the *Work Health and Safety Act (2011)* , all employers in NSW have an obligation to ensure their workers have a safe place to work. Transport for NSW has developed a suite of resources to help employers embed a positive road safety culture in their workplace, with the aim of highlighting the significance of the risk while creating an ethos of shared responsibility.

58	Wood, J. Brough, D. King, M. King, N. Bentley, L.A. Fylan, F. Black, A.A.	Pedestrians Personal Protection – Helmets, Clothing, etc.	Making nighttime pedestrians safer using innovative clothing designs	Nighttime pedestrians are at significant risk of being killed or seriously injured, because drivers often fail to see them in time to avoid a collision. Clothing incorporating retroreflective markers on the moveable joints creates a visual perception of 'biomotion' and improves nighttime pedestrian conspicuity. This study investigated whether biomotion-enhanced clothing retains its conspicuity if adapted to make it more acceptable to wear. In a nighttime closed road study, we compared the relative conspicuity of pedestrians to young drivers with normal vision when pedestrians wore biomotion strips of different thicknesses and patterns. versus other typical clothing worn by nighttime pedestrians. Results showed that all the biomotion clothing resulted in significantly longer conspicuity distances than sports, fluorescent yellow or black clothing (4x longer distances than black clothing). These effects were evident regardless of pedestrian orientation and have implications for the design of clothing for walkers and runners to enhance their nighttime safety.
59	Higgins-Whitton, L. Sterling, K. Murdoch, C.	Drink Driving Drug Driving Enforcement Programs Penalty Systems	Development and implementation of New South Wales drink and drug driving reforms	In 2018/2019, NSW introduced enhanced penalties for drink and drug-driving offenders. The reforms expanded alcohol interlock requirements to middle range offenders, vehicle sanctions to certain repeat drink drivers, and introduced penalty notices coupled with automatic licence supension for lower range offences. Key implementation challenges included responding to mixed stakeholder views, managing change across agencies, and providing effective communications. Complementing the reforms, offender rehabilitation courses in NSW are being reviewed to expand reach to more offenders. The number of roadside alcohol and drug tests is also increasing. A multi-stage evaluation is planned, with an operational review due late 2020.
60	Richards, M. Mudford, J.	Driver Risk Young Drivers Community Programs Education – general and other	TAC L2P Program Expansion and Improvements	The TAC L2P Program is a funded initiative by the Transport Accident Commission (TAC) and coordinated by the Department of Transport (formerly VicRoads) to provide supervised driving experience to young learner drivers between the age of 16-21 years. In 2018, the former VicRoads commissioned an evaluation and business case to analyse the program's performance and contribution to young driver safety in Victoria. The evaluation provided insights into the economic and social benefits generated by the program in Victoria. In addition to making a significant contribution to road safety, L2P was found to generate significant social and economic value by increasing economic participation and reducing social isolation. A number of improvements to the program were recommended and have now been actualised and successfully rolled out over 19/20.

61	Zurlinden, H. Hovenden, E. Gaffney, J.	Road Safety Strategy	Can I stop? Considering any opportunity to influence the multidisciplinary factors that result in a crash.	While over recent decades significant gains have been made in reducing the number of road traffic related fatalities in Victoria and Australia, in absolute terms this has started plateauing some years ago. This contrasts with the ambitious goal to achieve (close to) zero fatalities. The need for a significant change in road safety management has been identified (Wooley & Crozier, 2018). Based on insights gained during practical road traffic management, a study tour of nine countries (Gaffney, 2016), and a very comprehensive literature analysis, many opportunities to strengthen the current road safety work were identified. This includes an increased, vehicle-centred focus on crash avoidance, the reduction of traffic complexity and mental workload, the provision of targeted dynamic information of inclement weather and traffic conditions, and an integrated emergency response. This article aims at stimulating broad discussions among road safety experts for the development of next-generation road safety strategies.
62	Pearce, T.	Young Drivers Community Programs Road Safety Programs Novice Driver/Rider Licensing	Mentoring to increase compliance and road safety	Previous studies have indicated that unlicensed drivers are more likely than licensed drivers to be at fault and more seriously injured when involved in a crash. Having never possessed a driver licence is more prevalent among people with socio-economic disadvantage, low levels of literacy, difficulty understanding English language, difficulty establishing identity, socio-economic disadvantage or living in remote communities. The Tasmanian Learner Driver Mentor Program (LDMP) was established to simultaneously address the barriers to entering Tasmania's Graduated Licensing System (GLS) and to increase safe driving practices through compliance with GLS requirements. Programs are delivered by community-based organisations and give disadvantaged learners access to a vehicle and volunteer mentor supervisor drivers (mentors) who receive specific training relating to social issues that can contribute to unlicensed driving and unsafe driving behaviours.
63	Cameron, M. Newstead, S. Clark, B. Thompson, L.	Road Safety Strategy Drug Testing	Modelling the crash effects of random and targeted roadside drug tests in Victoria, particularly on drug driving involving methylamphetamine	The prevalence of Methylamphetamine (MA) in drivers on the road and the seriously injured has trended up steeply in Victoria during the last decade. Drug-driving with MA can be deterred by increasing the positive detection rate from roadside drug testing, particularly by targeted testing. Recent research has modelled the relationships between prevalence of THC and MA in seriously injured drivers and (a) random and targeted drug tests during 2006-2016 and (b) the positive detection rates from these tests. The 50% increase in roadside drug tests in Victoria during 2019, particularly targeted tests, is estimated to have saved 3 fatal crashes and 55 serious injury crashes. Further increases in targeted and random roadside drug tests are warranted, up to at least 426,500 total tests per year, and saving 24.5 fatal crashes and 140.5 serious injury crashes per year.

64	Smith, C. Sweeney, R.	Distraction & Inattention Driver Psychology Heavy Vehicles - Trucks, Buses, Hazardous Materials Road Safety Programs	Development of a truck driver public health project: mental and physical safety (MaPS) on our roads.	Individual, environmental and organisational factors can contribute to poor physical and mental health outcomes among truck drivers. The Injury Matters project, Mental and Physical Safety (MaPS) on our Roads, targets health issues facing Western Australian (WA) truck drivers and keeping them safe on our roads. A co-design approach has been applied to inform the MaPS on our Roads strategies. During the consultation phase, surveys, in-depth interviews and focus groups were conducted with WA's heavy vehicle industry. Overall results indicate that WA truck drivers frequently witness road traffic incidents while at work and are aware further actions are needed to improve their health status. However they experience a number of barriers to engaging in existing health and wellbeing initiatives. Consultation results have been used to inform the MaPS project focus areas, engagement strategies and future work that aims to improve the mental and physical safety of WA's heavy vehicle operators.
65	Beer, K. McCardel, M.	Road Environment Autonomous Vehicles Safer Transport & Mobility	Roads that cars can read assessment: practical applications in nsw	A 100 point 'Roads That Cars Can Read' checklist suited to Australian conditions was developed by Safe System Solutions Pty Ltd for Transport for NSW. This checklist was used to undertake Route Risk Assessments for three regions: the planned Smart Shuttle Autonomous Vehicle (AV) route in Olympic Park, Sydney and two planned regional automated vehicle trials; one in Armidale and one in Newcastle. The Roads That Cars Can Read Route Risk Assessments revealed numerous risks that may affect performance of autonomous vehicles. This paper details the key elements of a 'Roads That Cars Can Read' assessment and identifies issues for road designers and road operators when managing a road for autonomous vehicles.
68	McGrane, D. Terrell, M. Hurnall, J.	Speed, Speeding & Travel Speeds Signage & Signalisation NCAP And Consumer Test Ratings	ANCAP speed limit information function assessment	ANCAP have conducted testing and assessment of Safety Assist functions of vehicles since 2018. This includes performance assessment of a Speed Limit Information Function (SLIF) through on-road testing. A range of current model vehicles are fitted with a SLIF that can successfully detect and present applicable speed limits to the driver. In 2018 to 2021 ANCAP assessed 81 vehicles fitted with SLIF with the majority of the tests conducted in Sydney and Melbourne. This paper will outline how ANCAP undertakes the assessments, discuss the findings of these assessments and the issues discovered with the signs, locations and maps. ANCAP found there is inconsistency in signage around Australia making recognition by the vehicle difficult and inconsistent. The placement of road signs and street trees also must be considered in the location of a speed limit sign or a conditional speed limit sign.

69	Williams, T.	Drink Driving Distraction & Inattention Speed, Speeding & Travel Speeds Driver Risk	Community engagement and attitudes for road safety in Western Australia	As a result of a review of the Western Australian Road Safety Commission's (Commission) public participation and engagement activities carried out during 2019, broad interest in the Commission's community attitude and behaviour research was generated. The scope of this paper is the reporting and discussion of the Commission's: community attitude and self-reported behaviours relating to drink driving, seatbelts, mobile phone use and speeding; and; community perceptions and beliefs regarding road safety in Western Australia (WA) using the Kantar Public 10C Citizen Engagement Framework. Several years of survey results are provided and associated results from WA's driver segmentation research and road safety strategy development are discussed. Additionally, how the 10C framework results are likely to influence the development of WA's road safety strategy 2020 – 2030 outlined in conjunction with results from the community consultation process conducted for the development of the strategy.
70	O'Donovan, S. van den Heuvel, C. Baldock, M. Byard, R.W.	Driver Risk Older Drivers & Road Users Crash Data Collection Data Linkage	Cardiac disease and driver fatality	A retrospective review of autopsy files at Forensic Science South Australia (FSSA) in Adelaide, Australia was undertaken over a 13 year period between January 2005 and December 2017 for motor vehicle drivers aged ≥ 40 years who died while driving a vehicle. Autopsy examinations were performed on 303 drivers and 72 passengers. Of those traumatic fatalities, 48 (15.8%) of drivers had severe stenosis compared to 15 passengers (20.8%) and was not statistically significant. Although a concern was that drivers with significant cardiac disease may have increased rates of death in crashes with the causative role of the underlying cardiac disease obscured by trauma, this does not appear to be the case. Instead there is a distinct subgroup of drivers who die from cardiac events, and not trauma, while driving who may be increasing in number given the aging population.
72	Whyte, T. Kent, N. Bilston, L. Brown, J.	Child Restraints Crash Testing Biomechanics Crash Data Analysis	Side impact intrusion in child passenger deaths and the performance of child restraint systems	Side impact crashes are more likely to cause intrusion into the occupant space than other crash types which is a significant risk factor for serious injuries to child passengers. All child deaths in NSW from 2007 to 2016 were reviewed in this study, finding that intrusion into the occupant space appears to be the most significant factor related to child passenger deaths when children are appropriately and correctly restrained. Laboratory tests were devised and performed to examine the influence of intrusion and door topology on the injury risk of restrained child passengers. Armrest size and shape was found to affect head injury risk, with a flat door providing the lowest risk. This work demonstrates that optimising compatibility between vehicles and child restraints may be a way to minimise child injury risk in side impacts when children correctly use appropriate restraints.

73	Przibella, S. Ashton, R. Hooper, C. Rowland, M. Hall, P. Røhl, A. Kvist, S. Dockstader, C.	Road Environment Road Design Land Use & Urban Planning	The urban road and street design guide	What do safe urban streets look and feel like? The Victorian Department of Transport (DoT) is developing the *Urban Road and Street Design Guide* , a design guide for urban roads and streets to help answer this question. The project is a powerful opportunity to align the Department's Movement and Place Framework with safe systems thinking. Lead consultants Arup alongside Gehl have prepared planning and design advice to help practitioners achieve a vision for safe, connected, vibrant urban roads and streets for people to live, work, move, play and stay. The guide takes a Complete Streets approach to planning, designing and delivering transport in Victoria. It puts people first, emphasizing the importance of safe access for all road users. This perspective means that safety is fundamental to any good street design. The project provides a toolbox to better understand and visualize what safe systems looks like in urban contexts and supports practitioners to implement nuanced, practical solutions.
74	Davy, S. Carslake, J. Johnson, M. Gaffney, T.	Heavy Vehicles - Trucks, Buses, Hazardous Materials Motorcyclists Bicyclists Pedestrians	Construction logistics and community safety australia (CLOCS-A): progress towards safer outcomes for vulnerable road users	Currently across Australia, $55 billion worth of transport infrastructure projects are under development in the urban centres of major cities. These projects will significantly increase heavy vehicle movements and as a result exposure to vulnerable road user interactions raising the need for action to improve safety outcomes for vulnerable road users (VRUs). International best practice is recognised as Transport for London's (TfL) Construction and Logistics in Community Safety (CLOCS) and action is underway to adapt the CLOCS approach in Australia. This paper will present the results of the initial phase of Construction Logistics Community Safety Australia (CLOCS-A) (due to be completed in June 2020) and explore how these projects, and smaller state projects, are adapting the standards to protect vulnerable road users, where and why variances are occurring, what barriers are emerging and the path towards an Australian adapted CLOCS program.
75 (Poster)	Eramudugolla, R. Huque, M.H. Wood, J. Anstey, K.J.	Driver Psychology Older Drivers & Road Users	On-road driving errors in mild cognitive impairment	Dementia increases the risk of unsafe driving in older adults, but this is less apparent in pre-clinical stages such as mild cognitive impairment (MCI). There is a lack of detailed data on driving error patterns associated with MCI. We recruited older drivers from the community who completed a neuropsychological test battery and an on-road driving assessment. Compared to safe drivers classified as cognitively normal (CN) (n=242), safe MCI drivers (n=45) showed no difference in the rate of errors in different traffic contexts or error types. Unsafe CN drivers (n=17) made more errors in observation, speed control, lane position, and stop/give-way signs. Unsafe MCI drivers (n=9) had additional difficulties at intersections, roundabouts, and under self-navigation conditions. Unsafe drivers with MCI have difficulties under more cognitively demanding conditions, consistent with the increased rate of multi-domain type MCI found in this group.

76	Vumbaca, J. Bennett, J.M. Prabhakharan P.	Driver Psychology Young Drivers	Cognitive function and driving performance for young drivers: a systematic review and meta-analysis	Young drivers are still undergoing cognitive development at the time they begin driving. Little research synthesis on cognition and driving performance has been conducted for young drivers. A systematic review and meta-analysis on 18 studies examining cognition and driving for drivers between the ages of 15 and 25 was conducted. Results indicated a variety of cognitive domains have been examined in relation to a range of driving performance measures, however predominate focus has been on examining individual cognitive domains. Findings were varied with no single cognitive domain or test being found to consistently predict driving performance. Preliminary findings suggest that a composite approach with multiple domains might be suitable in this population to identify at risk young drivers. Similar to the older driver literature, this would allow for investigations of comprehensive cognitive models and potential applications of cognitive testing and training for young drivers to enhance safety.
77	Filardo, L. Senserrick, T. Hatfield, J. Boufous, S. Olivier, J. Fry, R. Thompson, J. Fernandes, R.	Motorcyclists Novice Driver/Rider Licensing	Evaluation of the NSW motorcycle graduated licensing scheme	The New South Wales (NSW) Motorcycle Graduated Licensing Scheme (MGLS) implemented in 2009, introduced a two-year second provisional period (P2) and extension of existing restrictions. An evaluation of the NSW MGLS consisted of a best practice review, outcome and process evaluations. The NSW MGLS was found to closely align with best practice. Comparing relevant crash trends, a number of positive findings were observed for P2 riders. However, positive outcomes were not observed in all statistical comparisons undertaken. Process evaluation showed engagement processes for training providers had improved and training was viewed positively, though not always found to be delivered consistently.
78	Yeung, M. Regan, M.A. Prabhakharan, P.	Signage & Signalisation Crossings (Pedestrian, School, Rail, Rural/Animal) Pedestrians	The relationship between pedestrian waiting times and illegal crossing behaviours at signalised intersections in the Sydney CBD.	The aim of this study was to examine the relationship between Individual Waiting Times (IWTs), Maximum Waiting Times (MWTs; imposed by the pedestrian light) and illegal crossing behaviour at nine intersection crossings in the Sydney CBD. An observational study was conducted (1.5-hours in the morning over two weeks) and validated with complementary video footage. Of the 6,931 observed pedestrians, 13.5% crossed illegally. The key finding from this study was that longer MWTs were significantly correlated with an increase in illegal crossings. The average MWTs at signalised intersections was approximately 70% longer than the average IWTs for those pedestrians that crossed illegally. The findings of research suggest that one possible mechanism to reduce illegal pedestrian crossing behaviour could be by reducing the MWT at signalised intersections.

80	Sriroongvikrai, K. Choocharukul, K.	IRAP, AusRAP, etc. Motorcyclists Pedestrians Legislation and Law	Impacts of speed limit changes on road safety risks: a case study of urban streets in Thailand	According to the WHO's Global Status Report on Road Safety, Thailand is among the top countries with highest traffic fatality rates. One contributing factor is the speed. The speed limit in Thailand is generally set at 80 km/hr for urban areas and 90 km/hr for roads outside built-up areas. Such figures are considered high and pose potential risks to road users. This study investiages potential impacts of speed limit changes. The International Road Assessment Programme (iRAP) star rating was utilized to investigate road safety in terms of risk scores for vehicle occupants, motorcyclists, and pedestrians. A total of 20 urban roads with different geometry and characteristics were selected from two cities in Thailand, namely, Bangkok and Phitsanulok. Sensitivity analysis results revealed that to achieve the target of 3-star or better roads, current speed limits need to be altered. Appropriate speed limits were also recommended for urban roads with different settings.
81	Brodie, C. Jooste, F. van der Wel, P. Tate, F.	Road Environment Policy Development And Implementation	Understanding the safety impacts and opportunities of New Zealand state highway resurfacings and renewals.	New Zealand generally experienced decreasing levels of road trauma (Deaths and Serious Injuries) up until the start of 2014, beyond which there have been four years of increases (2014-17) followed by a leveling off over the last two years. During the same period the maintenance regime, on the state highway network in particular, has also been revolutionized, with a reduced number of contracts, a change to a Network Outcomes Contract form, and a reduction, in real terms, of maintenance expenditure. This study looked to determine if there have been any changes to the state highway network condition over the last decade, if there is any relationship between those changes and road safety, and what safety outcome improvements might be possible if maintenance efforts in resurfacing and renewals was increased.
82	McLaughlin, M. McLaughlin, D. Hunt, R. Nagy, T. McLaughlin, L. Wilson, B.	Pedestrians Community Programs Road Safety Programs Education – general and other	Little Blue Dinosaur Foundation – our story – prevention through collaboration with community road safety stakeholders	Little Blue Dinosaur Foundation (LBDF) was established in 2014 in honour of Tom McLaughlin, aged 4 years who died in a pedestrian motor vehicle accident during a family holiday. In five years the Foundation have collaborated with 63 LGAs across 4 States to implement a cost effective child pedestrian road safety campaign designed to prevent trauma for very vulnerable road users. The Foundation have successfully gained five successive grants from Transport for NSW in the Community Road Safety Grant Program and campaign implementation has reached the target audience through stakeholder collaboration with Local Governments, State Governments, Police, Media, Schools and Members of Parliament. Featuring government endorsed messaging the key road safety education of the campaign aims to highlight importance of modeling safe road behaviour, working towards zero and draws on personal experiences of the impact of road trauma. Securing ongoing funding and resourcing will enable the Foundation to expand the campaign nationally.

84	Hodgson, G. McTiernan, D. Imants, P. Chevalier, A.	Crash Data Analysis Crash Data Collection	Safe system review of fatal crashes in the ACT	The ACT Justice and Community Safety Directorate engaged the Australian Road Research Board to undertake a Safe System review of ten years of fatal crashes in the ACT. The review identified common fatal crash factors across Safe System pillars (roads, speed, vehicles, people, and post-crash care) based on crash data and reports from the Australian Federal Police and Roads ACT. The method developed allowed analysis of crash factors and identification of crash patterns to determine 'gaps' in the System that likely contributed to the cause and/or severity of each crash. Using this, countermeasures were developed to address these gaps across the Safe System pillars.
86	Ponte, G. Elsegood, M Doecke, S.	Crash Data Collection Crash Data Analysis Data Linkage Ambulance and Emergency Services	Injury risk and delta-V - insights from event data recorder information and reported injury outcomes	This study examined event data recorder (EDR) information downloaded from 316 vehicles involved in crashes in South Australia from 2017 to 2019 matched to police crash reports and hospital records. The EDR vehicles contained 421 occupants and, while 70% of EDR vehicle occupants sustained no injuries, 7% percent had minor injuries, 21% of occupants were treated at hospital and 2% of occupants were admitted to hospital. Higher injury severity outcomes occurred in head-on collisions, rollovers and single vehicle collisions with fixed objects. Delta-V was a good predictor of injury, and for all crash types, an occupant in a crashed vehicle experiencing a total delta-V of 40 km/h had an injury risk of 60%, more than double the injury risk for a crash with a total delta-V of 20 km/h. In side-impact collisions, injury risk was much higher; a lateral delta-V of 40 km/h corresponded to an 87% injury risk.
88	Warner, W. Stephan, K. Newstead, S. Stephens, A. Willoughby, J. Shearer, E.	Distraction & Inattention Road Safety Programs Enforcement Technologies Statistical, Epidemiology and Other Road Safety Research Methods	Modelling the potential road trauma reductions of mobile phone detection cameras in NSW	The Road Safety Plan 2021 details the New South Wales (NSW) Government's commitment to improve road safety, including initiatives to research and enable camera-based technology to enforce mobile phone offences. In 2019 Transport for NSW (TfNSW) led a world-first non-enforcing pilot of fixed and transportable mobile phone detection cameras (MPDC), at locations across Greater Sydney. Monash University Accident Research Centre (MUARC) was engaged to estimate the potential reduction in road trauma from a proposed program of automated mobile phone enforcement. Modelling estimated that a program that reaches 99.5% of the NSW driving population and achieves 30% to 40% deterrence could prevent approximately 95 to 126 fatal and serious injury crashes over five years, equating to savings of approximately $126 million to $168 million. The use of overt signage highlighting camera locations would reduce the benefit of the program by around 80 per cent.

90	Elsegood, M. Mackenzie, J.	Road Design Autonomous Vehicles Computer Simulations - Restraints, Human Body, Vehicle Statistical, Epidemiology and Other Road Safety Research Methods	Determining the readiness of road line markings for autonomous vehicles through custom video analysis software	Two vehicles equipped with lane support systems (lane departure warning and lane keep assist) were instrumented with a GPS receiver and video cameras to record the detection rate of road line markings along an approximately 80 km route. Custom video analysis software was developed to determine the locations of line marking detections made by the vehicles post testing. An overall 97.8% detection rate was observed along the selected route, and the locations of the non-detections were further analysed to indicate possible causes of non-detections. Both lane support systems tested showed similar results for overall distances of line markings detected, but differences in the frequency of non-detections were reported.
92	Mackenzie, J. Ponte, G. Elsegood, M. Kloeden, C.	Speed, Speeding & Travel Speeds Road Environment Safer Transport & Mobility	A technical review of 40 km/h speed limits in the City of Charles Sturt local government area	A technical review was undertaken relating to the introduction of 40 km/h speed limits in certain areas within the City of Charles Sturt in South Australia. This involved the analysis of before and after traffic survey and crash data. Mean vehicle speeds decreased by 2.30 km/h, 85th percentile speeds decreased by 4.27 km/h, and weekday traffic volumes decreased by 7.4% in areas where the speed limits changed. Crash data was examined for equal periods before and after the 40 km/h speed limit changes and there was a 14.8% reduction in the number of casualty crashes on roads where the speed limit had been reduced from 50 km/h to 40 km/h, a 28.6% reduction in casualty crashes on roads that had a pre-existing (and retained) 40 km/h speed limit, and a 7.8% reduction in casualty crashes on Council-owned roads that retained a 50 km/h speed limit.
93	Bodzan, J. Parameswar, P. Storey, O. Dadley, D. Raisianzadeh, H. Le, J.	Intersections and Roundabouts (ITS - roads) Intelligent Transport Systems in Road Infrastructure Data Linkage Statistical, Epidemiology and Other Road Safety Research Methods	Identifying high-risk intersections by modelling driving behaviour with machine learning methodologies	Finding patterns in driver behaviour around intersections using large telematics data combined with statistical crash records in a highly accurate and predictive intersection model can enable a more preventative data driven service that saves lives. The Data Discovery Lab team within Enterprise Data and Analytics Services (EDAS), Transport for NSW recently examined the potential of using telematics data to identify high crash risk locations on NSW roads through Artificial Intelligence methodologies and Machine Learning algorithms. The methodology investigated the area in and around intersections accounting for information on driver behaviour obtained from telematics data as well as the statistical data recorded in previous years. The study has examined telematics data from 55 light vehicles, approximately 35,000 unique trips, at around 5,000 intersections and 841 crash sites in the Wollongong area. The data was pre-processed and reduced for this study.

94	Watson-Brown, N. Senserrick, T. Freeman, J. Davey, J. Scott-Parker, B.	Young Drivers Novice Driver/Rider Licensing Driver/Rider Training	Bad habits while racing to the starting line: obstacles to the development of young learner's safe driving practices	Graduated driver licensing (GDL) mandates extended supervised driving hours, providing opportunity to enhance young drivers' safe driving skills (Watson-Brown, 2020). Professional instructors provide a small proportion of on-road training compared to parents or lay supervisors; however, it is expected that they are equipped to teach the more safety-critical skills needed to reduce the high crash risk of newly independent novice drivers (Watson-Brown, 2020). This study aimed to explore the perspectives and experiences of instructors to understand the obstacles that inhibit the development of young drivers' safe driving practices as they traverse GDL. Thirteen southeast Queensland instructors were interviewed. A key finding was that instructors deal with an array of inappropriate ideation and behaviours that impacts the limited timeframe they have to focus on higher-order learnings that maximise safety and rule compliance. Learners' on-road training, as a critical element of GDL, could be improved with the integration of professional instruction and lay/parent supervision (Mayhew et al., 2017).
95	Fernandes, R. Strandroth, J. Cavallo, A. Banyer, G. Fry, R.	Road Safety Strategy Crash Data Analysis	Case-by-case analysis of current fatality trends to estimate future residual trauma in NSW	Transport for NSW is developing a roadmap for setting future road safety targets to move toward zero trauma by 2056, based on methodologies developed and applied in Sweden. Case-by-case analysis of all NSW fatalities in 2018 was conducted to forecast future trauma and safety performance, using detailed crash information as well as additional information on current and planned system improvements. Analysis shows that although the current pipeline of safety interventions in NSW will bring significant benefits they will not be enough to achieve zero fatalities in 2056 and will deliver greater benefits for vehicle occupants than for vulnerable road users. While new and innovative solutions are needed to address future residual trauma, the analysis also shows that many lives can be saved in the interim with earlier implementation of already known solutions, and by adjusting policy and delivery settings of current infrastructure and vehicle solutions to be more effective.
96	Wundersitz, L.	Distraction & Inattention Crash Data Analysis	Uncovering driver distraction and inattention in fatal and injury crashes	Driver distraction and inattention is an increasingly challenging issue for road safety worldwide. This study investigated the contribution of driver distraction and inattention within 186 fatal and injury crashes using recent in-depth road crash investigation data from South Australia, investigated 2014-2018. Using an adapted taxonomy of inattention, five subtypes of driver inattention were defined: misprioritised attention, neglected attention, cursory attention, diverted attention (distraction) and unspecified inattention. Of the 160 crashes for which there was sufficient information, 31% showed evidence of driver inattention contributing to the crash with the most common subtype of inattention being distraction (14% of all crashes). The distraction-related crashes included a variety of different distractions with those located in-vehicle the most prevalent followed by internal thoughts. Distraction from phone use was identified in 2.5% of all crashes (18% of distraction crashes).The wider context in which inattention-related crashes occurred was also examined to assist in developing system-based solutions.

98	Norberg, T.L. Radford, I. Rogers, S. Ferguson, S.	Older Drivers & Road Users Young Drivers Community Programs Education – general and other	Learner log book run and Greys driving skill enhancement run	In partnership with the Goulburn Rotary Club GMC has coordinated a sucessfull practical learner driver Log Book Run (LBR) for six years. Community consultation identified the need to also provide assistance to older drivers resulting in the adaption of the LBR for local seniors. Both programs are designed to encourage confidence in driving while identifying areas for improvement. Along with a practical on-road component, the programs utilise a safe system approach providing education on safer vehicles, safer roads and roadside, safer speeds and safer road users. The delivery of the programs enables community groups to actively contribute to encouraging a road safety culture in their community and the involvement of the Council ensures the programs apply best-practice evidence based approaches. Both programs are vital in our local community, as they are reaching the most vunerable road users, in an effort to foster a road safety culture.
99	Napper, R. Johnson, M. Johnston, V.	Road Design Intersections and Roundabouts Bicyclists Statistical, Epidemiology and Other Road Safety Research Methods	Safety, design and law: a new interdisciplinary approach to bicycle rider road safety	A novel problem-solving approach is demonstrated using an interaction at an intersection between a driver (turning left) and a cyclist (continuing straight). According to the road rules (RR141(2)), the bicycle rider must not to ride past on the left of a turning vehicle. However road rules and the built environment were not designed in harmony. The research hypothesis was that a new approach combining safety science, law and design were needed to approach this complex problem. The novel approach is for safety, law and design to simultaneously apply three main methods in a context of discussion. Two-dimensional drawing, three-dimensional modelling, and road rule annotation are used to represent the scenario, generate possible solutions, review, and iterate. The methods were accessible and effective for professionals from several domains.
100	Shen J. Prabhakharan, P. Bennett, J.M.	Hazard Perception	Assessing the ecological validity of button-press hazard perception tests	Hazard perception tests (HPTs) assess a driver's ability to recognise potential dangers on the road and respond appropriately. HPTs have been incorporated into numerous licensing schemes typically requiring drivers to respond to videos on a computer via a button-press. However, given drivers in reality do not respond to hazards with button-presses, the present study aimed to investigate the validity of using button-presses as a way to assess real-world hazard response behaviour. The between-subjects study, compared participant performance on a button-press HPT to accelerator and brake pedal responses to the same HPT in a driving simulator. Results revealed that response times between the button-press group and pedal-press group were significantly different in more than half the clips assessed, with the pedal-press group responding consistently faster than the button-press group, to the same hazards. The findings question the ecological validity of using button-presses to capture and translate real-world hazard response skills.

101	Mongiardini, M. Stokes, C. Woolley, J.	Speed, Speeding & Travel Speeds Road Environment Intersections and Roundabouts Signage & Signalisation	Evaluation of a warning system to reduce the risk of casualty crashes at rural junctions in South Australia	Rural Junction Activated Warning Systems (RJAWS) temporarily reduce the speed limit along the major legs of three-leg junctions when another vehicle is approaching from the minor road or turning right from the far-side leg into the minor leg. This study evaluated the RJAWS effectiveness and its potential to reduce the risk of casualties based on a trial at four rural intersections in South Australia. When the reduced speed limit signs are activated, the average travel speed along the major road is reduced between 11.3 km/h and 22.1 km/h, with a consequent reduction in the average relative casualty risk between 43% and 58%. Despite a relatively low compliance to the reduced speed limit, the RJAWS proved effective in reducing risky behaviour. When the sign was activated, the majority of drivers travelled through the intersection at speeds below the default speed limit. Extending the RJAWS program to additional intersections is strongly suggested.
104	Bodzan, J. Storey, O. Shaz, K. Wright, C. Ledger, S. McCaffery, T. Wall, J. Chevalier, A.	Data Linkage Statistical, Epidemiology and Other Road Safety Research Methods	A methodological approach to reducing connected vehicle data	The second stage of Transport for NSW's Cooperative Intelligent Transport Initiative (CITI) collected high volumes of raw in-vehicle data from 55 privately-owned light vehicles fitted with trial equipment over a ten-month period. Data were collected from two different devices fitted to participants' vehicles. The cooperative intelligent transport system (CITS) recorded data transmitted and received at 10 Hz (up to 10 datapoints per second) while a telematics device recorded data at 40 Hz (up to 40 datapoints per second) . It was essential to translate the hundreds of millions of data records into a more concise format to address research questions. This presentation addresses the intricacy required to reduce the data to engineer analytical datasets, reducing noise in the data and producing a range of summary datasets, maintaining quality outcomes to allow the investigation of road safety benefits and limitations of the CITS alerts.
105	Mulvihill, C. Horberry, T. Fitzharris, M. Lawrence, B. Schnittker, R. Lenné, M. Kuo, J. Wood, D.	Distraction & Inattention	Evaluation of a prototype driver distraction human-machine interface warning system	Recent advances in vehicle technology permit the real-time monitoring of driver state to reduce fatigue and distraction related crashes, particularly within the heavy vehicle industry. Relatively little published research has evaluated the human machine interface (HMI) design for these systems. However, the efficacy of in-vehicle technology depends in part on the usability and acceptability among drivers of the system's interface. The HMI of a prototype multi-modal warning system developed by the authors for driver distraction was evaluated in a truck simulator with eight car and six truck drivers using the System Acceptability Scale, comprehension and open questions. The results showed that all participants perceived the system as acceptable and useful, and that the warning modalities (visual, auditory and tactile) were largely understood correctly and perceived to be effective. This study identified no major design flaws with the recently developed HMI, but on-road evaluations are recommended to validate these findings.

106	Timms, M.	Motorcyclists Workplace and Work Related Road Safety General Enforcement	Towards zero: safety testing of police motorcycle jackets	By 2019, New South Wales Police Force (NSWPF) operated a motorcycle fleet of 120 road bikes. With riders increasingly exposed to all weather and road conditions, Traffic and Highway Patrol Command (THPC) commenced a search for high-visibility summer and winter motorcycle jackets that could provide improved safety and comfort. The timing of the project coincided with the establishment by Australian and New Zealand road safety agencies of the Motorcycle Clothing Assessment Program (MotoCAP), a world-first rating system for motorcycle clothing. THPC partnered with Deakin University to subject prospective jackets to the MotoCAP testing protocol and worked with a clothing manufacturer to build additional safety into their products. This combination of road safety/safe systems methodology and work health safety (WHS) due diligence represents a fresh approach to the procurement of uniform for organisations that operate motorcycles, as well as the manufacturers who supply that clothing.
107	Ledger, S.A. Chevalier, A. Hillier, P. Chircop, D.	Temporary Road Works Workplace and Work Related Road Safety Crash Data Analysis	Analysis of rear-end and other crashes related to roadwork sites in NSW	Transport for NSW (TfNSW) commissioned the Australian Road Research Board (ARRB) to conduct a systematic analysis of rear-end crashes (and other crash types) in NSW to identify key reported contributing factors to reduce their frequency and impact. The review analysed 118,628 crashes recorded in the CrashLink database reported in 5-years 2013 to 2017. Data were analysed by examining count data, percentages and cross-tabulations across a number of levels of analysis by crash location and crash type. Of all reported crashes, 1.43% (1693/118628) were related to roadwork zones and 40.3% of these (682/1693) were rear-end crashes. Rear-end crashes were more likely to be related to roadwork zones compared to non-rear-end crashes. Roadwork zone crashes tended to have more severe outcomes on rural roads, with heavy vehicles as the key traffic unit. One in five rear-end roadwork zone crashes involved distraction. These findings may assist when considering implementing countermeasures to reduce the likelihood of rear-end crashes related to roadwork zones.
109	Senserrick, T. Watson-Brown, N. Buckley, L. Watson, B. Scott-Parker, B.	Speed, Speeding & Travel Speeds Young Drivers Driver/Rider Training	Young Novice Drivers' Speed Management: A Systematic Review	Excessive speed is a persistent contributor to road trauma, with this risk exacerbated by youth and inexperience. This research aimed to systematically review literature on contributing factors to young driver travel speeds. Searches of key databases for research published between January 2009 to June 2021 yielded over 2,000 records. Of 167 full paper reviews, 46 intervention and 54 studies of individual characteristics and situational vehicle, road environment, performance and behavioural factors were included. The findings provide insights into potential fresh approaches to education on speed management when learning to drive, additional to the current stronger focus on volitional speed behaviour.

110	Milling, D.	Motorcyclists Road Environment Road Safety Audit and Road Safety Review Road Safety Barriers	Guidelines to provide roadside protection for motorcyclists	Currently in Australia Guidelines are not published to assist in identifying when safety barriers should be provided to protect motorcyclists from unforgiving roadsides. This includes guidance for the installation layout and lengths of a motorcycle-friendly barrier. Some approaches for identifying when to provide treatments include consideration of Black Spots, Black Lengths or routes with high motorcycle volumes. These approaches do not always result in the highest risk locations being treated additionally, the design and installation of protection is likely to vary. A proactive, warrant based approach is required to identify when to provide roadside protection for motorcyclists. Guidelines defining a Motorcycle Protection System (MPS), identifying and prioritising where to install MPS's, and how to determine the layout and length of MPS has been developed. These guidelines will allow for MPS's to be proactively installed, contributing to providing safer roadsides for motorcyclists and reducing the crash severity of motorcycle run-off-road crashes.
111	Przibella, S. Porter, L. Hooper, C. Rowland, M. Hall, P. Røhl, A. Kvist, S. Dockstader, C.	Road Environment Road Design Bicyclists Land Use & Urban Planning	Complete streets Victoria: the cycling guide	During 2019 and 2020 the Department of Transport with consultants Arup and Gehl are developing a design guide for cycling as transport in Victoria. The Cycling Guide is the first of a suite of modal-specific guides to support Complete Streets Victoria, an urban roads and streets design guide. This project represents a Victorian-first approach to design and planning cycling infrastructure that will empower and encourage practitioners to raise the standard of the Victorian cycling network and create safer outcomes for people who ride. The project takes a new safety–first, user-focused approach that captures whole of trip considerations. It provides strategic and technical guidance underpinned by safe systems to give practitioners confidence to implement safer more inclusive infrastructure.
114	Howe, M. Mackenzie, J. Reid, I.	Road Design Intersections and Roundabouts IRAP, AusRAP, etc. (ITS - roads) Intelligent Transport Systems in Road Infrastructure	What computer vision can tell us about road safety?	Aims to reduce fatalities on city roads by 2030 and within Australia by 2050 have been set but current methods to evaluate and validate safety through crash data do not allow for fast development cycles, often taking years to collect statistically representative data. If these aims are to be met, new methods of safety evaluation must be utilised to decrease the evaluation and validation cycle. Computer vision (CV) has recently become a viable technology for use in this area with its ability to extract a range of road user characteristics. This research explores previous safety research using CV, the current limitations of CV systems, and the next advancements of CV that could give new, exciting tools for evaluating safety. Also presented is a CV system capable of extracting road user characteristics for road safety studies and to build upon with new CV techniques.

115	Stokes, C. Moon, W. Johnson, J. Woolley, J.	Education – general and other	Safe system for universities: safe system education for tertiary engineering students update	Safe System represents long-established best-practice in road safety internationally and in Australia and New Zealand. However, there has been limited success implementing Safe System policy into practice. While Safe System theory is taught at some Australian universities, there are currently no consistent means of formal education before professionals enter the workforce, leading to a discrepancy between graduate engineer knowledge and industry best-practice. Here, we present an update to the Safe System for Universities (SS4U) project, which provides a means for consistent education of Safe System theory at a tertiary level.
118	Chircop, D. Hodgson, G. Hillier, P. Chevalier, A.	Data Linkage Driver Risk Road Safety Audit and Road Safety Review Temporary Road Works	Evaluation of yellow line marking and variable speed limit signs to improve safety in roadwork zones in NSW	To improve safety outcomes for road users and workers Yellow Line Marking (YLM) and Variable Speed Limit Signs (VSLS) were trialed with existing traffic controls in NSW roadwork zones. TfNSW commissioned ARRB to evaluate these initiatives by synthesising the findings from a variety of documents, data and other field based evaluations to determine if these initiatives should be deployed on an ongoing basis. For YLM, the positive safety benefits appear to be outweighed by the costs to implement and effort required to maintain. Additional robust evaluation and evidence would be required to quantify its benefits and justify implementation. VSLS benefits were more apparent, including the impact on driver adherence to speed limits, improved driver attention and reduced safety risk for workers. There seems to be value in continuing its use under controlled conditions to assess ongoing impacts. This evaluation approach could be applied by other organisation's evaluating traffic control initiatives.
119	Cosgrove, L.	Community Programs Early Childhood Road Safety Road Safety Programs	Responsivity and innovation in road safety education: are we listening to our audience?	As part of Transport for NSW's (TfNSW) Road Safety Education Program, *Kids and Traffic* works with early childhood organisations to support families and communities to improve safety outcomes for children. Ongoing engagement with early childhood and other key stakeholders enables responsive, evolving and strategic delivery of the Program within a double loop learning framework, driving creativity and innovation (Synnott, 2013). Evidence-informed responsivity to emerging social and educational trends and the needs and interests of stakeholders ensures *Kids and Traffic* maintains its relevance and position as a valued, trusted provider of road safety education professional learning and resources. Initiatives that address barriers to engaging early childhood services, families and communities in road safety education increase Program reach and effectiveness. Development of innovative approaches to road safety education which respond to the needs and interests of stakeholders supports the Program's goal of zero child road trauma.

120 (also Full Paper)	Budd, L. Newstead, S.	Vehicle Crashworthiness Crash Avoidance and Crash Severity Reduction Pedestrians Policy Development And Implementation	Future light vehicle safety priority areas in Australia	This analysis aimed to identify future priority action areas for light vehicle safety by identifying fatal crash types that will not be fully addressed in the future by projected improvements in active and passive safety in the light vehicle fleet. Modelling the likely future crash profile of the light vehicle fleet in Australia identifies target areas for future vehicle design and technology improvements that will assist in achieving the goals of Towards Zero. Analysis identified four priority areas:: (i) fatal pedestrian crashes, (ii) single vehicle frontal crashes with fixed objects, (iii) front-to-front vehicle crashes and (iv) front-to-side impacts, including straight crossing path and right turn across path crash types. Suggested countermeasures include the investigation mechanisms to improve the natural penetration of key driver assist technologies, particularly in light commercial vehicles, as well as new or enhanced technologies targeting crashes involving intersections, speeding, fatigue, distraction, pedestrians and bicycles. (See also: https://doi.org/10.33492/JRS-D-21-00001)
122	Baldock, M. Lindsay, T.	Drink Driving Drug Driving Drug Testing	Characteristics of crash-involved drink and drug drivers and motorcyclists	This study examined the characteristics of 1,277 hospitalised road users in South Australia in the years 2014 to 2017, with reference whether they tested positive to alcohol or other drugs (the three drugs prescribed in the South Australian *Road Traffic Act (1961)* : THC, methamphetamine, and MDMA). This examination used a database combining hospital data, police-reported crash data, licensing information, and the result of alcohol and drug tests conducted by Forensic Science SA. Findings include: that those combining drugs and alcohol only comprise a small proportion of hospitalised motorists; that drivers are more likely to test positive to alcohol or methamphetamine, while motorcyclists are more likely to test positive to THC; drug and alcohol positive motorists tend to exhibit a range of other risky behaviours, and also tend to sustain more severe injuries in the event of a crash.
123	Wilson-Ridley, J.E. Woods, J. McAdie, S. Norberg, T. McDougall, K.	Distraction & Inattention Motorcyclists Road Safety Programs Education – general and other	Joe Rider motorcycle safety campaign – cross-border road safety cooperation and implementation into local government regions	In 2016, QPRC first partnered with ACT Motorcycle Rider Association (MRA) to extend their 'Joe Rider' Motorcycle Safety Campaign into NSW regions. Adapted for local implementation with three local governments the project featured targeted strategies to local motorists about risks for motorcycle riders while encouraging local riders to ride safely. The campaign builds on 'Look but failed to see' crash research and aims to positively support riding in the region through increased awareness. From a successful pilot, the project was incorporated into QPRC Road Safety Action Plan and delivered annually from 2017-2020 involving stakeholder involvement of local rider trainers Stay Upright and Australia Post. Fostering ongoing cross-border collaborations the project capitalizes on region-wide impact of a shared approach while benefiting from local implementation. While there are challenges to cross-border collaborations the benefits have been realized through increased reach and participation from local motorists on each successive implementation of the campaign

124	Martin, L. Turner, S.	Pedestrians Signage & Signalisation	Pedestrian safety at traffic signals	While traffic signals are relatively safe for pedestrians (compared with other intersection forms of control and mid-blocks) there are still a significant number of fatal and serious crashes at these intersections in New Zealand. It is challenging to achieve safe system at such intersections given most are located on arterial roads and therefore have a 'traffic movement' function. Lower speed limits to achieve operating speeds of 30km/h or less are not always viable at these intersections except where there is also a high place-making function, such as CBDs and larger activity centres. Severe pedestrian crashes at traffic signals are often a result of either a pedestrian or a driver not obeying the signal phasing. This is especially the cases when a pedestrian is being struck by a vehicle traveling straight through the intersection (either at the pedestrian crossing or on the intersection approach). To address these crashes, it is important to understand the factors, including behaviours, behind jaywalking and red light running. These factors vary from intersection to intersection and by time of day. A better understanding of these factors will assist in reducing road trauma.
125	Sivasankaran, S.K. Rangam, H. Balasubramanian, V.	Crash Avoidance and Crash Severity Reduction Motorcyclists Statistical, Epidemiology and Other Road Safety Research Methods Post Crash Rehabilitation	Epidemiology and injury profiles of single vehicle motorcycle fatalities in Tamil Nadu, India, 2009-2017.	Single-vehicle crashes which do not collide with other vehicle or pedestrians which are involved in an accident due to causes such as self skidding, hitting stationary objects, trees which is simply contributed by the drivers themselves. Such type of accidents which are contributed by the drivers themselves.single-vehicle crashes account for a large proportion of fatal accidents. In India, a significant proportion of accidents are single-vehicle motorcycle crashes. Extensive research has been carried out to investigate the risk factors and patterns associated with single-vehicle motorcycle crashes.All the motorcycle crashes reported from 2009 to 2017 which resulted in fatalities among which single-vehicle crashes alone were extracted from the database. Analysis of injury information identified in single-vehicle crashes, motorcyclist's most commonly sustained head injuries (51.27%). Injuries to the multiple body parts (20.13%), leg (3.26%) and hand (3.18%) were also commonly reported. Further investigation is required to develop effective countermeasures for reducing fatalities.

126	Sivasankaran, S.K. Rangam, H. Balasubramanian, V.	Road Environment Crash Avoidance and Crash Severity Reduction Crash Data Analysis Statistical, Epidemiology and Other Road Safety Research Methods	Analysis of injury severity in single-vehicle four- wheeler crashes with drivers being at-fault in Tamil Nadu, India.	Single-vehicle crashes are of major concern in both developed as well as developing nations due to the severity of injuries it results in. Several studies in the past have highlighted that single-vehicle crashes account for a large proportion of fatal accidents. In India, a significant proportion of accidents are single-vehicle crashes. According to the report by the Ministry of Road Transport and Highways (MoRTH, 2018), a total of 4,67,044 accidents have been reported by the states and union territories in which have claimed 1,51,417 lives. However, a clearer picture with respect to single-vehicle crashes is unavailable. Single-vehicle crashes are generally classified into two types: one in which the vehicle collides with the pedestrians and the other where the vehicle does not collide with other road users. The vehicles which do not collide with other vehicle or pedestrians which are involved in an accident due to causes such as self skidding, hitting stationary objects, trees which is simply contributed by the drivers themselves. Such type of accidents which are contributed by the drivers themselves is referred to as out-of-control single-vehicle crashes. The influence of roadway and environmental factors play a major role in these crashes. The objective of the present study is to obtain a clearer understanding with respect to the injury severity of the out-of-control single-vehicle four-wheeler crashes with the drivers being at fault. Contributory factors including driver, roadway, and environmental characteristics are investigated and discussed.
127	Rangam, H. Sivasankaran, S.K. Balasubramanian, V.	Heavy Vehicles - Trucks, Buses, Hazardous Materials Crash Data Analysis Statistical, Epidemiology and Other Road Safety Research Methods Ambulance and Emergency Services	Investigation of injury patterns in heavy-duty single vehicle crashes based on real-world accident data in Tamilnadu, India	Heavy-duty vehicles serve a vital function in any of the developing economies. In India, heavy-duty vehicles are defined as vehicles with gross vehicle weight over 11,793 kgs. These vehicles include bus, truck, tractor, and heavy articulated vehicle/trolleys.In recent years, there has been an interesting interest in studying the contributory factors for single-vehicle crashes especially that of heavy-duty vehicles. Single-vehicle crashes are those crashes where vehicles do not collide with other vehicles or pedestrians, but due to causes such as self skidding, hitting stationary objects, trees which are simply contributed by the drivers themselves. Descriptive statistical analysis has been carried out. The dataset was obtained from RADMS database where 4983 crashes were identified to be heavy-duty single-vehicle crashes.Analysis of injury descriptors in heavy-duty single-vehicle crashes showed that drivers most commonly sustained multiple injuries (13.2%) to various body parts followed by head injuries (12.2%) and hand injuries (2.6%). Further investigations are required.

129	Warren, J. McCreanor, V. Cameron, C. Vallmuur, K. Pollard, C. Hope, M.	Data Linkage Statistical, Epidemiology and Other Road Safety Research Methods Emergency Hospital Trauma	The risk and cost of pelvic and lower limb fractures from road transport crashes: Motorcyclists are key	Pelvic and lower limb fractures from road transport crashes (RTCs) form a considerable proportion of the trauma related workload in acute care settings and is an area of focus, not only for the health care sector, but for road safety. Post-crash analysis of linked Queensland hospitalisation data was undertaken to calculate the risk and cost of acute treatment, in addition to the risk and cost of hospital readmissions 12 months post injury, by road user group (car occupants, motorcyclists and cyclists). Risk of hospitalisation was 26 times higher for motorcyclists than car occupants, with hospitalisation costs being $80 per registered motorcycle, compared to $4 per registered car. Over 24% of injured motorcyclists are readmitted within 12 months; this is 28% higher than car occupants. Data linkage is crucial for providing a more comprehensive profile of hospital utilisation and associated costs beyond initial acute treatment.
131	Terranova, P. Piantini, S. Fitzharris, M. Gabler, H.C. Savino, G.	Crash Avoidance and Crash Severity Reduction Crash Data Analysis Motorcyclists Scooters	Motorcycle active safety systems: a cross-national comparison of applicability in the Australian, Italian, and US fleets	Motorcycle-based active safety systems, e.g. antilock braking, motorcycle automatic emergency braking, collision warning, curve warning, and curve assist, have great promise to avoid or mitigate many of the crashes suffered by powered two wheel (PTW) riders. Earlier studies have examined the applicability of these systems to individual crash types, e.g. rear-end vs intersection crashes, as a means of prioritizing active safety systems development. However, there may be large regional differences in the distributions of PTW crash type, motorcycle type, and road systems, and hence in the priority for development of systems. The study objective is to compare the applicability of active safety for motorcycles in Australia, Italy, and the US using police-reported crash data from each region. The analysis found stark differences in the expected applicability of active safety systems across the three regions. This has important implications for regulators, and may require country- specific minimum performance requirements for PTW active safety countermeasures.
133	Taylor, M. Taneja, S. Tofa, M. Hope, G.	Driver Psychology Hazard Perception	Floodwater on roads: driver behaviour and decision-making	In Australia, vehicle-related flood fatalities represent a large proportion of all flood deaths. Fitzgerald et al. (2010) and Hamilton et al. (2016) found that driving into floodwater accounts for 48.5% and 53%, respectively, of flood-related drowning deaths in Australia. However, little is known about the frequency and circumstances in which Australian drivers enter floodwater. Here we report the findings of a nationally representative survey (n=2104) that explores driver behaviour and decision-making around water on roads. We present a statistical analysis of drivers who have entered floodwater to identify the characteristics of drivers who are more likely to enter floodwater, and an analysis of the situational factors and influences on decision-making when drivers attempt to drive through floodwater. Lastly, we explore the implications of these findings for road safety, flood risk communication, and driver education.

134	Phan, D.C. Truong, L. Nguyen, H.D. Tay, R.	Road Safety Strategy Land Use & Urban Planning Safer Transport & Mobility Crash Data Analysis	Can walking and cycling for train access improve road safety?	This paper investigates the impacts of train commuters' access modes on road safety at a network-wide level, using a case study in Victoria, Australia. Crash and census data were aggregated at the Statistical Area Level 1 (SA1) for the analysis. Results of negative binomial regression models illustrate positive effects of using train for commuting, either with walking or car access modes, on reducing both total crashes and severe crashes. The safety effects of commuting by train with the cycling access mode appear to be positive, which however were not statistically significant.
135	Yunos, M.N.M. Hakendorf, P. Adey-Wakeling, Zoe	Statistical, Epidemiology and Other Road Safety Research Methods Post Crash Rehabilitation	Agreement on fitness to drive outcome between rehabilitation medicine physician prediction and occupational therapy on-road assessment	Assessment of fitness to drive is a complex and ideally multidisciplinary process, with no defined gold standard of assessment. This prospective audit investigates the agreement on fitness to drive outcome between Rehabilitation Medicine Physician (RMP) prediction and occupational therapy (OT) on-road assessment results in 242 patients across a 4 year period. Predication is based on history, collateral history, screening assessments and clinical judgement of a doctor experienced in driving assessment. Objective practical on-road assessments are completed by a driver-trained occupational therapist. Correlation is further assessed for subcategories of cognition and assessment for vehicle modification. The percentage of agreement was 88.6% with slight agreement (weighted kappa 0.25) between the RMP and OT on-road outcome. The percentage of agreement was greatest (91.4; weighted kappa 0.3) for patients that required modification assessment, and lowest (85.7%, weighted kappa 0.24) for patients undergoing assessment for cognitive indications. This study demonstrates higher level of correlation for clients undergoing assessment for physical limitations, with prediction of impact of cognition on driving performance evidenced as more challenging. Occupational therapy on-road assessment is therefore a pivotal assessment tool to ensure maximization of both maintenance of client independence, and identification of at-risk clients.
137	Frost, F. Faulks, I.	Distraction & Inattention Enforcement Programs Enforcement Technologies	Snap-chat – mobile phone camera enforcement and community attitudes	The introduction of mobile phone detection cameras in NSW is a world-first program to target phone use while driving, a critical aspect of distracted driving. Monitoring community attitudes to this new enforcement is important, as insights gained can be used to adapt and develop policy. The study reported here, when completed, will provide a series of snap shots of community views over the period of the introduction and deployment of mobile phone cameras. Early indications from the data show that there is strong community support for the new enforcement program, with a shift in drivers' perceptions towards an increased likelihood of being caught for a mobile phone offence. There is concern that the demerit point penalty for the offence is too harsh, although the fine penalty is accepted. It is anticipated that the mobile phone camera enforcement program will result in a positive change in driver behaviour.

140	Meyer, D. Muir, S. Slikboer, R. Silva, S. Imberger, K. McIntyre, A. Pyta, V.	Driver Risk Statistical, Epidemiology and Other Road Safety Research Methods	Modelling the relationship between driver history and crash risk	The objective of this study was to determine if offence history can be used to predict future Fatal and Serious Injury (FSI) crash involvement. Using data extracted from Victoria's Road Crash Information System and Driver Licensing System, statistical models for future FSI crash involvement were developed using machine learning methods. Models were produced for a general sample (representative of the general population) and five subgroups (probationary, older, heavy vehicle, motorcycle and banned drivers). The accuracy of models improved when offence history variables were included with demographic and licensing variables. Speeding, seatbelt and traffic light offences and driving bans were important predictors for future FSI crash involvement in the general sample. Total number of recent offences and traffic infringement notices (TINs) were important predictors for future FSI crash involvement for the subgroups.
141	Olivier, J. Laolert, P.	Bicyclists Legislation and Law Personal Protection – Helmets, Clothing, etc. Statistical, Epidemiology and Other Road Safety Research Methods	Does biomechanical and epidemiological evidence of bicycle helmet effectiveness translate to a population?	Many studies have found bicycle helmets reduce the risk of head injury following a crash or fall. Some argue these do not translate to a population reduction in cycling head injury. This is often due to a lack of relevant data prior to helmet promotion and/or legislation. Western Australia introduced bicycle helmet legislation on January 1992 and, unlike other Australian states, has electronic hospital records from the early 1970's. Using an interrupted time series approach, the rate of serious head injury per 100,000 were compared following helmet promotion from the mid-1980's and helmet legislation in 1992. Serious head injury among cyclists were increasing prior to helmet promotion or legislation but reduced by a combined 63% by 1993. This reduction coincided with large increases in helmet wearing in WA across all-ages.
142 (Poster)	Bartels, J. Mestroni, K. Plant, B.	Young Drivers Driver/Rider Training	Supervised practice hours among older novice drivers in Victoria: stakeholder perceptions and readiness to obtain supervised driving practice	There is no requirement in Victoria for learner drivers older than 21 years to complete supervised driving practice before sitting the drive test. This research sought to understand stakeholders' views about the value of supervised driving experience for learners over 21 and the willingness of older novice drivers' to complete supervised practice hours. Focus groups and interviews with novice drivers, licence testing officers, and driving instructors (Study 1) showed agreement that supervised driving experience for older novices may result in better, safer drivers. An online survey with older novice drivers (N = 968) (Study 2) revealed approximately one third had completed at least 80 hours of supervised practice; the remainder reported they would be willing to complete 72.25 hours (SD = 33.60) before sitting the drive test. Improving access to supervisors could help to increase the number of practice hours that older novice drivers in Victoria complete.

148	Wood, J. Brough, D. King, M. King, N. Bentley, L.A. Fylan, F. Black, A.A.	Pedestrians	Making nighttime pedestrians safer using innovative clothing designs	Nighttime pedestrians are at significant risk of being killed or seriously injured, because drivers often fail to see them in time to avoid a collision. Clothing incorporating retroreflective markers on the moveable joints creates a visual perception of 'biomotion' and improves nighttime pedestrian conspicuity. This study investigated whether biomotion-enhanced clothing retains its conspicuity if adapted to make it more acceptable to wear. In a nighttime closed road study, we compared the relative conspicuity of pedestrians to young drivers with normal vision when pedestrians wore biomotion strips of different thicknesses and patterns versus other typical clothing worn by nighttime pedestrians. Results showed that all the biomotion clothing resulted in significantly longer conspicuity distances than sports, fluorescent yellow or black clothing (4x longer distances than black clothing). These effects were evident regardless of pedestrian orientation and have implications for the design of clothing for walkers and runners to enhance their nighttime safety.
150	Gardener, R. Janssen, K. Caen, A. Soni, S.	Road Environment Financing Road Safety Crash Data Analysis Data Linkage	Developing a Geo Artificial Intelligence Process to Assist with Programme Evaluation	Every year in New Zealand (NZ), more than 150 people are killed or seriously injured on curves on roads in the rural network. In fact, approximately 95% more injury crashes occur on curves classified as high-risk (Abley, 2017). A GIS mapping tool was developed to identify high-risk out-of-context curves and an evaluation commissioned to measure its success. Identifying the extent of curve improvements across NZ over a 3-year period was a daunting proposition. A fresh approach to engineering project evaluation was required - one that didn't involve systematic investigation of all separate engineering works completed and all speed limit changes gazetted. This paper discusses the journey to developing an automated intelligence process for evaluating out-of-context curve improvements on State Highways (SH) and the subsequent expansion of the process for high-risk curves on the local roads network.
151	Bartels, J. Leckel, J.	Pedestrians	Pedestrian road safety project	The Department of Transport commenced a review of pedestrian road safety to provide a deeper understanding of the factors relating to pedestrian crashes, the road safety benefits of pedestrian related rules as well community understanding and compliance with current rules. Activities include undertaking a legislative review of the Victorian Road Safety Road Rules (2017); analysis of pedestrian crash data to determine trends, patterns and causes of crashes, and how these may relate to compliance/knowledge of road rules; stakeholder and community consultation on the road safety benefits, challenges and issues for pedestrians and how they are affected by infrastructure, education and regulatory compliance. Results to date highlight the Road Rules are complex and have strengths and weaknesses. Results also show crashes involving pedestrians mostly take place when crossing the road and old and young pedestrians are more vulnerable. Community and stakeholder perceptions will be shared once engagement is completed.

152	Lamond, R.	(ITS - vehicles) Intelligent Transport Systems in Vehicles Speed, Speeding & Travel Speeds Workplace and Work Related Road Safety	Assessment of CSG operator driving related transport incidents and impact of implementing in vehicle monitoring systems (IVMS) on incident frequency.	Previous research has highlighted that work-related road safety is an area that requires further attention with a focus on developing research informed interventions aimed at producing significant cost and efficiency savings to industry, whilst in parallel improving road safety outcomes for workers and community. The implementation of In Vehicle Monitoring Systems (IVMS) is one such intervention. Origin Energy installed IVMS in their vehicle fleet in 2011 (2010: 4,849,000 km driven by 231 vehicles) to assist in the reduction of work related road incidents. This study reviews the impact that decision had on incident frequency. Road related incident frequency rates were reduced by approximately 60% since the implementation of IVMS in 2011 (Ratio Rate = 0.395, CI 0.230 to 0.721). The study makes recommendations for further analysis of work-related driving incidents to better understand driving behaviour and to establish a cost-benefit relationship for intelligent transport systems (ITS) such as IVMS.
153	Lambrinos, A.	Road Environment Fleet Safety Safer Transport & Mobility Road Safety Programs	Transurban Queensland motorbike incident response trial	Recognising the risk to drivers involved in a road incident and the challenges of responding in peak times, Transurban Queensland launched an Australian first Incident Response Motorbike trial in late 2018. The aim of the trial was to improve initial on scene response times and clearance times, to reduce congestion around incidents and improve the performance and reliability of the road network and safety of all motorists. The motorcycles have demonstrated an important use in getting through congestion sooner than other vehicles and provide basic support to motorists including fuel and water. At the same time making an assessment to ensure the response team know exactly what is happening at the scene. This presentation will focus on the significant safety benefits that have resulted from the trial – including reduced clearance and response times and the impact this has on motorists in the event of a breakdown or incident.
156 (Poster)	Blackman, R. Wilson, A.	Motorcyclists	Motorcycle choice and self-reported crashes of Queensland motorcyclists	Research has explored relationships between crash involvement and motorcycle characteristics, including engine capacity, motorcycle type and power-to-weight ratio. The current research continues this path, focusing on results of a Queensland rider Survey in 2017-2018. The survey attracted 1290 valid responses from fully licensed riders (71%), restricted licence holders (26%) and learner riders (3%). Types of motorcycle reportedly ridden most frequently included Sport/Naked sport (52%), Cruiser (18%), Adventure (9%) Sport-touring (7%), Trail and Enduro (4%) and Touring (3%). An on-road crash in the past three years was reported by 21% of participants, with statistically significant differences by motorcycle type ($p = .019$). Riders of Trail and Enduro motorcycles were most likely to report a crash (32.7%), followed by Adventure (27.1%), and Sport/Naked sport (24.6%) types. Cruiser riders were least likely to report crash involvement (14.8%). Crash involvement by motorcycle power-to-weight group showed no statistically significant results.

157	Sultani, M.	Road Design Intersections and Roundabouts Road Safety Audit and Road Safety Review Policy Development And Implementation	Developing a black spot investigation program for Kabul city roads	With a rough data available, around 5230 people is estimated to die on the roads annually that is 15.1 people per every 100,000 populations in Afghanistan (Organization, 2018). Kabul city with around 5 million residents deals with serious road safety challenges, still there is not developed a black spot investigation program, this research investigated five major black spots in Kabul city. A rough crash data from traffic department show that five roads are the black major spots. To determine the exact spots, site visits were conducted, measuring speed, observing road users' behaviors and the road environment. The major concerning reasons were investigated. Speeding was a major factor of crashes on curves, two ways stop control at major intersections were the main factor of crashes. It concluded that speed reduction measures taken, pedestrian bridges built, and the intersections transformed to signalized with some geometric changes.
158	Di Stefano, M. Landgren, F. Mestroni, K. Cruise, B.	Road User Behaviour and Human Factors Medical and Post Crash Care	Medical fitness to drive: development of transport and medical practitioner partnership to enhance road safety	Drivers with medical conditions and disabilities represent a significant proportion of our driving community. During 2017, several coroner reports on deaths without inquest involving drivers with established medical conditions triggered the need for closer collaboration with peak medical bodies to understand medical fitness to drive issues, medical review processes and road safety risks. We applied an evidence based and action research approach involving participant engagement at every stage to interrogate the issues. The expert action group guided discovery work, a systematic literature review and countermeasure investigations. Despite national medical fitness to drive (FTD) guidelines (available since 1998), we identified gaps in medical practitioner knowledge and skills, low driver awareness and other systems factors. The group committed to a further three year term to continue delivering FTD outcomes demonstrating true application of across domain collaboration to achieve road safety benefits – as reflected by "Towards Zero – A Fresh Approach".
160	Liersch, C.	Vehicle Crashworthiness Crash Avoidance and Crash Severity Reduction Restraints	Bus passenger protection – are we there yet? After 30 years what are the new challenges to bus safety.	Bus Safety has taken enormous strides forward in the last thirty years. Road infrastructure has improved on many highways to reduce the likelihood of a bus "run-off road" or bus to vehicle crash. Vehicle technology has improved with increased safety features included in bus specifications. Driver training and driving regimes have been revamped to reduce driver fatigue. Additionally bus seating with integrated safety belts have been introduced. But are we at risk of losing some of what we have gained through the fast-paced change in Bus manufacturing and the components used within such vehicles? This paper reflects on the past, and the many improvements made over the last three decades. It also examines some potential risks manifesting themselves within the bus industry and includes suggestions as to what we may be able to do to avoid losing some of the great gains that have been achieved in recent years.

163	Elsegood, M. Doecke, S. Ponte, G.	Speed, Speeding & Travel Speeds Crash Data Collection Crash Data Analysis Data Linkage	Speeding insights from the CASR EDR study	Travel speed data retrieved from vehicles with event data recorders (EDR) were matched to police reports and hospital records, allowing insight into driver behaviours. Details of 316 cases were collected and categorised into crash types and movement groups. Vehicles travelling at self-selected, unhindered, free speeds immediately preceding the crashes were shown to be speeding in 36.1% of cases. Males were shown to have a slightly higher proportion of speeding from the sample, but speeding was shown to be statistically significantly more prevalent with drivers aged below 40 years old.
164	Di Stefano, M. Landgren, F. Ross, P. Townsend, T.	Road User Behaviour and Human Factors Vulnerable Road User Safety	Motorised mobility device use: consensus based non-regulatory countermeasures to enhance user road safety	Motorised Mobility Devices (MMDs) including powered wheelchairs may enable people with limited walking capacity to enhance community participation, however user safety is a consideration. Rider licensing and MMD registration processes are unsuitable considering the health systems context of MMD procurement and use. MMD users present with differing impairment states requiring a health framework approach encompassing user suitability assessment, MMD prescription and training, and ongoing review. These processes have the potential to underpin and enhance safety on our road system, addressing Pillar 4 (Safer road users) of the UN Decade of Action for Road Safety Global Plan and contributing to 'Towards Zero' goals. Following a literature review and stakeholder consultation, we identified gaps in resources and tools to support evidence based assessment, prescription and review processes considering safe system principles. Using action research approaches and targeted surveys, we established content validity for tools and resources ready for trialling by health practitioners.

166	Aggrey, S. Ssentongo, B. Kato, A. Onyuth, H. Mutekanga, D. Ongom, I. Aryampika, E. Lukwa, A.T.	Road Safety in Developing Countries	Perceived factors associated with boda-boda (motorcycle) accidents in Kampala, Uganda	According to the United Nations, nearly 1.25 million people are killed and up to 50 million people are injured on the world's roads every year. Uganda loses about 10 people daily to road accidents, costing about US$1.2 billion annually which represents about 5% of the GDP. The objective of this study was to identify causal factors that can be associated with boda-boda accidents in Uganda. A cross sectional study assessed 200 boda-boda riders in the urban areas of Kampala, Uganda. Interviews using semi-structured questionnaires were administered to all participants. Data collected was entered in excel and imported to STATA for analysis. Multivariate and bivariate analyses were conducted to determine factors that influenced accident risk perception. All variables which were significant at bivariate level and thought to be theoretically important in influencing the outcome variable were included in a logistic regression model. All tests were performed at a significance of P<0.05. Competition for passengers with other public transport operators (83%), negligence of road safety rules (78%) and inadequate helmet usage (62%) were the main factors perceived to be associated with boda-boda accidents. Other factors identified by the respondents include age of the boda-boda rider (58%) and drug use (56%) (P<0.05). At multivariate analysis, competition for passengers (AOR 17, 95%CI 1.34-26.5) and being in between 18-25 years old (AOR 19, 95%CI 1.42-27.1) remained statistically significant. This study revealed behavioral factors by all public transporters as the main factors associated with boda-boda accidents in the Urban Kampala. This demonstrates the need for holistic interventions to address such boda-boda accidents in Uganda. Such interventions can be through digitization of transport system for clients to engage remotely with the transport operators, routine refresher trainings of all transport operators and construction of lanes for boda-boda riders.
167	Imberger, K. Naznin, F. Catchpole, J.	Driver Risk Driver Psychology Penalty Systems	Offence and crash involvement of high frequency, high-risk offenders	There is a high-frequency, high-risk offender group that is a high road safety risk and large economic burden on the Victorian community. This group continues to commit offences regularly, despite incurring demerit points, driving bans, court appearances, imprisonments, vehicle impoundments and crash involvements. Therefore, inducting this group into some form of countermeasure program could curtail their offending and risk-taking and thus reduce road trauma, and the economic cost of operating Victoria's traffic enforcement, justice and licensing administration systems. An earlier study developed a method of identifying this group of offenders, and the current study aimed to reselect a more up to date cohort and understand their characteristics during selection and follow-up periods. The current study also aimed to determine how many crashes and other events such as offences could be saved by a highly effective countermeasure program designed especially for this offender group.

168	McLean, R. Butler, M. Shope, J.T. Kerse, N. Connolly, M.J.	Older Drivers & Road Users Safer Mobility Legislation and Law	Screening older drivers: the experiences of general practitioners with medical fitness to drive assessments	Highly-motorised countries have increasing numbers of ageing older drivers. In many of these jurisdictions, health practitioners are responsible for undertaking the screening of older drivers, via medical assessment of fitness to drive (FtD), to ascertain suitability to continue to hold a driver's licence. In New Zealand, all older drivers are required to have a medical FtD assessment at ages 75 years, 80 years and then biennially. This study used an interpretive description qualitative methodology to understand the FtD assessment process from the perspectives of ten general practitioners (GPs). The results indicate that GPs use FtD assessment as a way of staging a clinical conversation about mobility and driving cessation. The assessment process, however, challenges a patient-centric approach and can negatively impact relationships. This study also highlights several system issues encountered by GPs, limiting their capacity to provide best practice FtD assessments and mobility counselling for older adults.
169	Imberger, K. Watson, A.	Speed, Speeding & Travel Speeds Driver Risk Enforcement Programs Penalty Systems	Effectiveness of vehicle Impoundment for Victorian high level speeders	Victoria Police have had the power to impound the vehicles of particular offenders since 2006 as part of "anti-hoon" laws. At this time impoundment lasted 48 hours (Stage 1), with three months for repeat offenders. In 2011 the impoundment laws were revised to allow 30 day (Stage 2) impoundment for a first offence. The two impoundment stages were investigated for effectiveness on speeding offending for high level speeders (who speed 45 km/h or more over the limit) as part of a wider project evaluating the effect of various sanctions on speeding drivers. The impoundment countermeasure was introduced after others, such as increased licence bans and demerit points. The results for both stages of impoundment were favourable and showed that impoundment reduced speeding re-offence rates. In addition, the impact of the licence ban was greater for those who experienced impoundment, indicating the value in both these sanctions in reducing high-level speeding.
172	Feng, Y.R. Meuleners, L.B. Ng, J.Q. Fraser, M.L. Tjia, D. Mortlet, N.	Older Drivers & Road Users	Changes in driving performance after first and second eye cataract surgery: a driving simulator study	Driving is heavily dependent on vision. Whilst self-reported driving-related difficulties reduce after cataract surgery, less is known about the impact of cataract surgery on objective driving performance measures. This study recruited patients with bilateral cataract from three public hospital ophthalmology clinics in Western Australia to investigate changes in driving performance as measured by a driving simulator. Participants completed a research-administered questionnaire, a cognitive assessment, three visual tests and a driving simulator assessment before and after first and second eye surgery. After adjusting for potential confounders, the number of crashes/near misses decreased after both first and second eye cataract surgery, whilst the amount of time speeding only reduced after second eye surgery. As binocular contrast sensitivity improved, the risk of crashes/near misses and the amount to time speeding were reduced. These findings support the importance of timely first and second eye cataract surgery for cataract patients.

174	Wescombe, A.	Road Design Intersections and Roundabouts Signage & Signalisation Crossings (Pedestrian, School, Rail, Rural/Animal)	Traffic Analysis – AI from a bird's eye view	Traditional methods of traffic data collection are primarily limited to vehicle data collection only, or requires labor intensive manual observations that can be prone to error. To provide a complete and comprehensive understating of how an intersection, the collection of aerial imagery is used to survey a traffic scene. This enables the observation of the behavior and interaction of all road users, including pedestrians and bike riders. This footage is processed using artificial intelligence, which assigns user classifications, determines interaction between users, and calculates turning movements. Further information is collected on origin destination, traffic behavior and desire lines. The data collected is analysed to determine critical safety operation, including time to collision and post encroachment time. Traffic behavior can be determined by analysing dwell time, evasive behavior and signalised intersection compliance. Understanding the fundamental interaction between road users allows practitioners to improve road spaces to align with safe system principles.
175	Biswas, R.K. Olivier, J. Senserrick, T. Williamson, A. Friswell, R.	Distraction & Inattention Driver Risk Hazard Perception	Definitions and associated factors of headway: a systematic review of passenger vehicle studies	Unsafe headway or driving too close to the lead vehicle in a moving traffic risks rear end crashes; a leading crash type in Australia. This review aimed to systematically review headway definitions and associated factors in light passenger vehicle studies published between 1980-2020. Of 5442 articles identified, 110 were retained. Only 49.6% defined headway sufficiently for reproducibility. Nine broad domains of associated factors were observed: speed, lead vehicle type, traffic condition, road characteristics, task engagement, driving under influence, weather, demographics, and safety alert system that affect headway. Improving definitions and addressing these domains is necessary to reduce rear end crashes.
177	Reynolds, A.	Emergency Hospital Trauma Other Mobility Transport - Scooters, Segways, Quad bikes and SSVs, Horses, etc.	E-Scooters – are they last mile solution or the last mile health problem?	The "Last mile Problem" describes the difficulty in getting people from a transportation hub including railway stations, bus depots and train stations to their final destination. Micro-mobility devices including two wheeled motorised devices such as e-bikes, e-scooters, e-skateboards and Segways are considered a solution to the 'last mile transport' problem and are becoming increasingly popular globally. In September 2017, e-scooter company 'Bird' launched its first scooter sharing service in Santa Monica. Since then it has grown to over 100 cities and facilitated over 10 million rides . Various other companies have launched e-scooter ride share initiatives around the globe. Findings of this review indicate that there was a sudden increase in presentations to the emergency department following the launch of shared e-scooters.

178	Mongiardini, M. Stokes, C. Leone, P. Marchesan, C. Premrl, J. Varsos, P. Grzebieta, R. Williamson, A.	Road Environment Speed, Speeding & Travel Speeds	Evaluate travel speeds and associated risk of casualty crashes through intersections in Australia using naturalistic driving data	Numerous crashes occur at intersections due to their inherent nature of creating potential points of conflict between traffic flows from different directions. To minimise the risk of casualty crashes, intersection designs should mitigate travel speeds within safe energy levels. This study aims to identify speeds and associated casualty risks of Australian drivers when travelling through some of the most common types of intersections. Speeds of vehicles travelling in free-flow fashion through 93 intersections were extracted from the dataset of the Australian Naturalistic Driving Study (ANDS). Potential correlation of average and 85th-percentile speeds with intersection design characteristics was investigated. The risk of casualty crashes was assessed based on average speed and expected impact angles for each type of intersections. Of all the types of intersections considered, roundabouts are characterised by the lowest average and 85th-percentile travel speeds, and the only design with average speeds resulting in a casualty risk below 10%.
180	Wade, S.D. Ranasinghe, N. King, T.	Speed, Speeding & Travel Speeds Road Environment Heavy Vehicles - Trucks, Buses, Hazardous Materials (ITS - vehicles) Intelligent Transport Systems in Vehicles	Road safety innovation for heavy truck movements across structures	Transurban operates managed motorways, including Melbourne's CityLink, which connects to public motorways in the north, south and west of the city. CityLink is divided into two sections, the north-south leg known as the Western Link and the east-west leg known as the Southern Link. As part of Victoria's current 'Big Build', construction resources such as heavy steel and pre-cast concrete beams are required to be transported by trucks along CityLink and other parts of the road network. The 'Big Build' is a government initiative involving numerous infrastructure projects, including the removal of a number of rail level crossings at multiple locations throughout Victoria. CityLink comprises a number of elevated road structures and, as part of accommodating these trucks, Transurban reduced the structural and operational risk for travel by developing a tool for use by heavy vehicle operators, allowing them to have visibility whilst en-route of where and how to travel.
182	Page-Smith, J. Schuster, R. Ziekemijjer, P. Bishop, B.	Speed, Speeding & Travel Speeds Driver Risk	Country driver behaviour	Road deaths in regional Victoria have increased, with at least half of all Victorian road fatalities occurring in regional Victoria since the mid-2000s. Internal TAC research suggests that the majority of people killed on roads in regional Victoria are residents of regional Victoria. A large proportion of these died close to home. Survey results suggest there are few significant differences in self-reported road safety behaviours between regional and metropolitan residents; and corresponding potential outcome(s) given greater exposure on higher speed rural roads were explored. This study primarily investigates differences in road safety related attitudes and behaviours between residents of regional Victoria and their metropolitan counterparts; and is focused on 2018 results. Expanded Road Safety Monitor results from 2019 will be available at the time of presentation.

183	Doecke, S. Elsegood, M. Ponte, G.	Hazard Perception Crash Data Collection Crash Data Analysis Data Linkage	Pre-crash driver reactions from event data recorders	A considerable number of modern vehicles contain event data recorders (EDRs) that detect when a collision has occurred and log the last few seconds of driving data prior to the crash. The Centre for Automotive Safety Research's EDR study (CASR EDR) that began in 2017 has collected 335 EDR files from crashed vehicles and matched them to police reports and injury data from hospitals. EDR files from the bullet vehicles in this sample were analysed in order to gain fresh insights into pre-crash driver reactions. Only half of the drivers engaged in hard braking and/or evasive steering prior to a crash and the average speed reductions are generally lower than 14 km/h. This may have implications for the effectiveness and operation of vehicle technologies that seek to improve pre-impact braking or autonomously steer around a hazard and speed limit policies that are based on safe impact speeds.
184	Truelove, V. Oviedo-Trespalacios, O. Freeman, J. Davey, J.	Distraction & Inattention Young Drivers General Enforcement	A mixed-methods study examining the impact of legal enforcement on concealed phone use while driving	Legal countermeasures have been implemented in Australia and many jurisdictions worldwide in an attempt to reduce mobile phone distracted driving. However, an important factor that has frequently been overlooked is that legal countermeasures may counterintuitively promote the behaviour of trying to conceal the phone while driving. This study used a mixed method design, consisting of focus groups and a longitudinal survey, to examine concealed phone use while driving among young Queensland drivers. The focus groups identified that reading messages while driving was reportedly the most frequently engaged in phone use while driving behaviour and it is easy to conceal, therefore this behaviour was the focus in the longitudinal survey. The overall results revealed that the current perceived certainty of being apprehended for phone use while driving has a limited deterrence influence for concealed phone use while driving, however avoiding punishment is a strong predictor of future engagement in the behaviour.
185	Ziekemijjer, P.E. Page-Smith, J. Reynolds, A.	Driver Risk Restraints Crash Data Analysis	Injury prevention hot-topics: trauma associated with seatbelt non-use and ute occupants	An investigation into Victorian road trauma trends combined with attitudinal and behavioural data in relation to seatbelt non-use and involving ute occupants is presented. The two top selling cars in Australia are light commercial vehicles (LCV) (Heckscher, 2020) specifically utilities. 7% of Victorians report driving utes (RSM2018) with drivers of utes, almost all males, being significantly more likely to engage in dangerous behaviours than other drivers. Additionally, Victorians report high seatbelt use compliance while driving (97%) or a passenger (96%), with ute drivers less likely (91%) to always wear their seatbelts when driving.

188	Tucker, J. Watt, C. Hocking, N. Browning, T.	Advocacy Communication and Media Distraction & Inattention Education – general and other	Set your phone then leave it alone – an anti-distraction campaign	Driver distraction from interacting with mobile phones is an ongoing issue in Queensland, across Australia and internationally. The Royal Automobile Club of Queensland (RACQ) partnered with the Motor Accident Insurance Commission (MAIC) to develop a campaign aimed at reducing drivers' interactions with mobile phones through education, encouraging a fresh approach through explaining how to set their phones to 'do not disturb' (DND) mode prior to driving. The campaign comprised social and traditional media and included activation events, out of home, cinema, radio, online and television advertisements. Longitudinal market research was conducted in July 2019 (establishing pre-campaign baseline), in August 2019 (following wave 1 of the campaign), and in January 2020 (following wave 2 of the campaign). At the end of the campaign, significant changes were evident – including a significant reduction in hand-held phone use whilst driving and an increase in use of the DND phone function.
190	Minogue, K.	Policy Development And Implementation Insurance Legislation and Law	When the rubber hits the road - Australia's motor accident injury insurance schemes and autonomous vehicles	With human factors consistently playing a role in motor vehicle accidents, autonomous vehicle technology is expected to dramatically improve road safety. But significant challenges arise in ensuring that, under motor accident injury insurance (MAII) schemes across Australia, coverage is uniform whether a person is injured or killed in in an automated vehicle crash or in an accident involving a human driver. MAII schemes differ in the ways they provide compulsory personal injury insurance cover for crashes and a consistent national approach to injury insurance is imperative. Significant reform work is underway with the National Transport Commission (NTC) specifically targeting the area of motor accident injury insurance (MAII) in their 2019 policy paper. This talk will report on the reform work being done as well as canvassing the ongoing challenges of insurance coverage in accidents caused by automated vehicles.
192	Waller, E. Woolley, J.	Policy Development And Implementation Road Safety Strategy Safer Mobility Safer Transport & Mobility	Safe system capability development in the context of industry	The safe system approach underpins Transurban's road safety strategic framework. To support our capability in road safety, Transurban has implemented regionally based road safety action plans that reflect the safe system pillars. We have also established a road safety community of practice with members drawn from across business functions and, most recently, developed a bespoke safe system professional development program. This presentation will cover the motivation for the program, its development approach, implementation and outcomes.

194	Rakotonirainy, A. Glaser, S. Bond, A.	(ITS - vehicles) Intelligent Transport Systems in Vehicles Autonomous Vehicles	Demystifying the automated vehicle trolley problem	Future Automated Vehicle (AV) capabilities, cavalierly and irresponsibly informed by Sci-Fi movies or social media, are confusing the public. The media abounds with AV scaremongers portraying future AV as a God-like entity able to decide the life and death of road users. The trolley problem is a theoretical experiment in utilitarianism and deontological ethics. It is often quoted as the ultimate moral quandary that AV will solve despite human enable to reach a consensus about it. This paper highlights the methodological misconception of the AV trolley problem. We argue that the ethical trolley problem should be analysed through the lens of AV technology advances. We show that AV technology is far from being able to solve the trolley problem and are not even aiming for. This paper demystifies the perception that AV could be an intelligent weapon. It contributes to improve AV community acceptance.
195	Vanselow, J. Vagedes, X. Young, D.	(ITS - vehicles) Intelligent Transport Systems in Vehicles Autonomous Vehicles	Department of transport and Bosch CAV highway pilot trial on Victorian rural roads	As part of Victoria's Towards Zero 2016-2020 Road Safety Strategy, the Department of Transport (DoT), the Transport Accident Commission (TAC) and Bosch partnered together to develop and trial automated vehicle technology. The prototype SAE L3 Automated Driving System (ADS) was developed by Bosch, integrated in a donor vehicle, and specifically adapted to operate on Victorian high-speed rural and regional roads, where a disproportionate amount of road trauma occurs. This innovation project aims to contribute towards the long-term reduction of road trauma in this unique environment. The trial identifies key focus areas for road safety practitioners and road managers, assisting them in enabling Automated Driving (AD) on Victorian regional roads to reduce road trauma. Challenges and enablers influencing the ability of an ADS to perceive and navigate the unique Victorian rural and regional road environment were identified throughout the trial. Key points in ensuring a higher AD functional availability include the consistent application of road standards, availability of up-to-date road network data and ongoing road maintenance.
196	Harris, B. Soo, J. McKechnie, D. Filipovic, M. Young, D.	(ITS - roads) Intelligent Transport Systems in Road Infrastructure (ITS - vehicles) Intelligent Transport Systems in Vehicles	Exploring the safety potential of cellular-V2X based vehicle connectivity, results from the advanced connected vehicles Victoria trial	The Advanced Connected Vehicles Victoria (ACV2) trial is a partnership between the Department of Transport Victoria, Telstra, Lexus Australia and the Transport Accident Commission. This trial developed and tested a connected vehicle system using Cellular Vehicle-to-Everything (Cellular-V2X) technology to enable communication between vehicles and with a network hosted platform to improve safety. The ACV2 system enables safety warning messages to be delivered to vehicles with very low latency using the existing Telstra 4G network. This approach to connectivity gives the potential for wide-scale deployment without significant roadside infrastructure expenditure, which will be a large hurdle for adoption. It is anticipated that this technology solution could facilitate earlier realisation of vehicle connectivity and its potential safety benefits. The trial successfully tested six road safety-oriented use cases that consider speed, intersections, Vulnerable Road Users (VRU) and rear-end crashes. The key lessons learnt and implications for future road safety applications will be shared.

197	Somers, A. Johnston, D. Vanselow, J.	Intersections and Roundabouts (ITS - roads) Intelligent Transport Systems in Road Infrastructure Autonomous Vehicles (ITS - vehicles) Intelligent Transport Systems in Vehicles	Adapting automated vehicle perception for safer roads, results from the omni-aware trial project	An innovation project was funded through the Victorian Government's Towards Zero Action Plan to equip a crash hot-spot intersection as part of the Connected and Automated Vehicles Trial Program. This is understood to be the first long-term deployment of this type within the Asia Pacific region and one of very few around the world. This paper introduces the Omni-Aware technology used in the trial project and will report on the results and lessons learned. Omni-Aware draws upon Automated Vehicle sensing technology by deploying multiple LIDAR (Light Detection and Ranging) sensors to an intersection to build a highly accurate continuous spatial awareness of all pedestrians, cyclists, cars, buses and trucks.
198	Poulter, C. Muir, C. Wishart, S. O'Hern, S. Stephan, K. Newstead, S. Newnam, S. Vu, L.H.	Driver Risk Hazard Perception Legislation and Law Workplace and Work Related Road Safety	Investigating driver compliance with road rule 79A in Victoria	The purpose of this project was to investigate driver compliance with Road Rule 79A (RR79A), which requires drivers to slow to 40km/h when passing a stationary enforcement/emergency vehicle. To investigate driver compliance with RR79A, a study was conducted involving a community survey, an on-road driver compliance study involving retrospective analysis of CCTV footage on a high-speed road and focus groups with emergency service workers. Awareness of the rule was high among community survey respondents, however their understanding of the circumstances in which the rule applies was far lower. Observed compliance was low, with less than 40% compliance across all emergency vehicles in the on-road study. Close following distance, non-compliance of other drivers, and limited visibility of enforcement and emergency vehicles were identified as major barriers to compliance.
200	Graham, P.	Driver Risk Motorcyclists	Motorcycling – high risk, but legitimate form of transport	Motorcyclists still make up around 18% of all road deaths and serious injuries in New Zealand, despite representing less than 3% of road users, and make up a disproportionate share of ongoing health cost and trauma. In order to address motorcyclists themselves, a detailed analysis of recent crash data was undertaken, along with qualitative research among motorcycle riders, to understand the factors which might lead to a useful conversation with this target audience, by treating them as legitimate road users in a safe system.
201	Moon, W. Corben, B. Ultmann, Z. Strandroth, J. Riess, A.	Policy Development And Implementation Road Safety Strategy Road Safety in a Global Perspective Workplace and Work Related Road Safety	A modernised safe system model	While the safe system model has been active in Australasia for over a decade, jurisdictions have implemented it to varying degrees and with varying success. This model takes a holistic view of the road transport system and the interaction of various elements including roads and roadsides, travel speeds, vehicles, and road users. It aspires to create a road transport system where human mistakes do not result in death and serious injury. Traditionally, these four pillars have been represented as a circle with four quadrants with no clear explanation as to how each of these quadrants interacts with each other and functions within the system. This paper discusses how the integration of the pillars can improve the implementation of road safety measures and the development of genuine 'system design'. This system design approach could enhance current geometric design guides and enable the elimination of harm over a set time frame.

202	Mortimer, M. Wrzesinski, C. Chapman, S. Horan, B.	Novice Driver/Rider Licensing Education – general and other	Using virtual reality to increase awareness on safe interactions between light and heavy vehicles	The first year of independent driving is associated with high crash and fatality rates. While there are a number of initiatives focusing on improving safety for younger drivers there remains little focus on safe interactions between light and heavy vehicles on our roads. This paper discusses the use of Virtual Reality (VR) to facilitate two different VR experiences involving interactions between light and heavy vehicles from a perspective that most drivers wouldn't typically experience. The first experience focuses on a heavy vehicle's safe braking distance and the second on the need for heavy vehicles to use two lanes when making tight turns. For each situation the participant experienced the same interaction as both a passenger in the light and heavy vehicles. Results show that participants were able to empathise with each of the drivers and gain increased awareness around safely interacting with heavy vehicles.
203	Daley, M. Elhenawy, M. Masoud, M. Glaser, S. Rakotonirainya, A.	Crash Avoidance and Crash Severity Reduction (ITS - vehicles) Intelligent Transport Systems in Vehicles Bicyclists Pedestrians	Detecting road user mode of transportation using deep learning to enhance VRU safety in the C-ITS environment	This research aims to achieve the highest level of injury prevention by developing a deep learning approach to enhance Vulnerable Road Users (VRU) safety in the Cooperative Intelligent Transport Systems (C-ITS) enviroment. The proposed approach provides strong classification capabilities for transportation mode detection based on using the total linear acceleration data across 1-second monitoring for each reachable C-ITS entity inside the communication coverage. The results on the validation set showed a binary classification accuracy of 93.04% when distinguishing between VRU (individuals Walking, Running, or Cycling), and Non-VRU (individuals in a Car or Bus). This accuracy decreases to 88.64% and 80.50%, based on four and five classes metric consecutively that can stratify VRU modality and demonstrates the difficulty of accurately distinguishing transportation by car and bus. The approach warrants further testing and may hold promise for future C-ITS development and efficient implementation.
204	Vanselow, J. Harris, B. Soo, J. Young, D.	Autonomous Vehicles (ITS - vehicles) Intelligent Transport Systems in Vehicles Policy Development And Implementation	Towards zero connected and automated vehicle trial grants program –identifying road safety actions though public-private collaboration	To achieve its longer-term vision of zero lives lost on Victorian roads, the Victorian Government's Towards Zero road safety strategy recognised the need to investigate future technologies' potential contribution to delivering this vision. To this end the Victorian Government allocated $9 million to facilitate a trial of Connected and/or Automated Vehicle (CAV) technology on Victorian roads. The trials aimed to inform and support Victoria's readiness for these technologies in order to realise their potential safety benefits. The CAV trial grant projects will be evaluated against the program's original purpose, and the value of the projects to the Victorian government will be assessed. The projects required industry and government collaboration to achieve the project goals. Partnership between government and private industry presents opportunities and challenges for both parties but fundamentally, closer ties allow for better understanding for addressing problems and generating solutions for public benefit.

207	Chan, M.	Heavy Vehicles - Trucks, Buses, Hazardous Materials	Developing a heavy vehicles safety features roadmap in order to promote safer heavy vehicles beyond the basic legal requirements	Victoria Government has a large pipeline of significant infrastructure projects being delivered over the next 10 years. Amongst these projects are high value multi-year investments including Metro Tunnel, West Gate Tunnel, Railway Crossing Removals and North East Link. The majority of these infrastructure projects are being undertaken in the Melbourne central business district (CBD), highly populated inner suburbs on the fringe of the CBD, and metropolitan areas. Heavy vehicles are interacting constantly throughout the day with vulnerable road users on their way to and from the numerous project sites and its surrounding areas. The purpose of this heavy vehicle safety features roadmap is to promote safety beyond basic legal requirements.
209	Graham, P.	Road Safety Strategy Crash Data Analysis	Estimating the effect of multiple combined interventions: the IILM	The Integrated Intervention Logic Model (IILM) is a tool developed by the New Zealand Transport Agency (NZTA) in partnership with key road safety stakeholders to inform strategies aimed at improving safety across the network. The tool uses crash data and evidence-based research and models to estimate reductions in deaths and serious injuries (DSIs) based on a specific dose of each intervention working in synergy. It includes a baseline projection of deaths and serious injuries against which the impacts of the interventions can be estimated. Twelve interventions have been modelled to date.
210	Vanselow, J. Somers, A. Johnson, D. Young, D.	Intersections and Roundabouts Road Safety Audit and Road Safety Review (ITS - roads) Intelligent Transport Systems in Road Infrastructure Crash Data Collection	Using lidar data for analyzing road safety at an intersection – evaluation of the Omni-Aware data-set for road safety research	The Victorian Government has partnered with Omni-Aware to conduct a trial of technology to help improve road safety at intersections. Light Detecting and Ranging (LIDAR) sensors are often used by Connected and Automated Vehicles (CAVs) to perceive and navigate the road environment, however the Omni-Aware project takes LIDAR technology to the roadside to test its potential to bring the benefits to more road users sooner. One intersection in Melbourne was equipped with LIDAR sensors at each corner, the point clouds were merged to produce a single dataset that can be used to identify road user movements through the intersection. The result is a rich dataset with huge potential for road safety research. This paper will describe the dataset including any limitations and assumptions. Road safety researchers can access this data by application to the Department of Transport.
211 (Poster)	McIntyre, J. Neumayer, H.	Crossings (Pedestrian, School, Rail, Rural/Animal) Bicyclists Pedestrians School Safety	Darebin's octopus school pilot program	The Octopus School program is a Darebin City Council initiative designed to increase the number of students actively travelling to school, along with decreasing congestion and improving road safety in primary school precincts. Council has been working directly with schools and the local community to manage travel to school issues for over ten years, including investment in school infrastructure through Walking, Cycling, Speed reduction, and Traffic Management capital programs, and externally supported programs such as Bike Ed, Walk to School and Fit 2 Drive. Council developed an approach to work intensively with one school every year to complete four modules, which represent varying amounts on engagement from different stakeholders, culminating in the construction of road safety treatments funded by Darebin Council. The four modules assist the school with setting up a sustainable program of achievements to embed active travel behaviours across the community.

213	Baththana, J. Zia, H.	Road Safety Strategy Community Programs Road Safety Programs	Using community feedback to complement road safety risk metrics	In 2019 New Plymouth District Council (NPDC) completed district-wide consultation to gather feedback on road safety issues in the district under the assumption that locals know local roads best. Consequently, the New Plymouth district wide safety review tool was developed to explore the opportunity to use community feedback to complement commonly used road safety risk metrics. Typically, metrics such as Collective Risk and Personal Risk and more recently Infrastructure Risk Rating (IRR) have been used to prioritise road safety improvement projects in New Zealand. This new tool will enable practitioners the use of community ideas and concerns in prioritising road safety projects, ensuring an inclusive decision-making approach.
214	King, M.J. Rodriguez, J.E. Oviedo-Trespalacios, O.	Pedestrians Safer Mobility Statistical, Epidemiology and Other Road Safety Research Methods Emergency Hospital Trauma	Injury while drink walking in public places: comparison of patterns associated with vehicle collisions and falls	Drink walkers are at high risk of collision with vehicles, however they are also at risk of falls when using footpaths and related public places, an issue of greater relevance in the current context of promotion of active travel alongside the move Towards Zero. Differences in drink walking and injury patterns were investigated using 10 years (2008-17) of Queensland Injury Surveillance Unit data. Preliminary results show that pedestrian falls are six times more common than vehicle collisions, while drink walking comprises a larger percentage of falls cases (9.0%) than collisions with cars (5.5%) or motorcycles (5.9%). In contrast, males are more highly represented as drink walkers in collisions with cars (82.5%) than falls (63.3%). Together with age differences, the results point to a need to focus on pedestrian infrastructure on footpaths and related areas to reduce falls risk, and exploration of the contribution of differences in spatial and temporal exposure.
215	Talukdar, M.M.A. Raihan, M.A.	Speed, Speeding & Travel Speeds	Over speeding and road safety in Bangladesh	Over speeding is one of the major causes of road traffic crashes in Bangladesh. Heavy vehicle drivers violate the speed limits frequently even at the crash prone locations of the highways. The main objective of this study was to investigate the potential causes of over speeding that triggers the crash probabilities. Questionnaire surveys followed by an in-depth interview were conducted at different heavy vehicle bus and truck terminals of Dhaka city from July to December 2018. While researching the reasons behind over speeding, it was found that saving time (37%), and carrying more passengers and quick delivery of goods (14%) were the triggering factors. Other significant factors were driving at free flow speed (17%) whenever possible, escaping from police harassment (10%), earn more thus making more trips (13%), and overcoming the time lag from congestion (9%). A combined public-private initiative is thus essential to address the over speeding related crashes on the highways in Bangladesh.

216	Samadder, M Mondal, T.N.	Community Programs Road Safety Programs	Examining group dynamics: involving community people towards safer road	Road accident is considered as one of the leading causes of death in recent years. In Bangladesh, roads are nothing but killing machines which ranked it first among the South Asians countries. Besides all the initiatives taken organizing small groups at the community level to reduce road accidents across rural areas in Bangladesh is a pressing priority. Several NGOs undertook different initiatives in achieving road safety and reducing fatalities in roads. Following Tuckman's model, this paper analyzes the relevance of group dynamics and the effectiveness of CRSG (Community Road Safety Group) as a model for ensuring road safety based on six different groups which were intensively studied in different stages of qualitative research method. Due to lack of group coordination actions taken for reducing road fatalities was less effective. Recognizing the group's effort in attaining road safety, incessant interrelations, inspirations, and supervisions can only sustain it's success and functions.
217	Davis, C.I.	Speed, Speeding & Travel Speeds Road Environment Road Design IRAP, AusRAP, etc.	Impact of community reaction on Mildura Council's speed reduction project in residential streets	Aiming to improve community safety and livability, in 2015 Mildura Rural City Council (MRCC) embarked on a review of speed related safety on 1,000km of its sealed road network. This paper analyses the impact of community reaction while providing an overview of the project. The review included collection of AusRap and ANRAM data, commissioning a review of all project area speed limits, to make new speed reduction recommendations, and validate through community consultation acceptance of the proposed recommendations. Broadly, the review recommended 40 km/h in all residential streets. Three randomly selected focus groups unanimously supported the recommendations. However, during construction there were unexpected negative print and social media attacks on council and its staff, predominantly focused on construction of the island thresholds, and not on the reduced speed limits. The consultation learnings explored in this paper could assist practitioners to plan community consultation in their speed reduction programs.
218	Messias, D.	NCAP And Consumer Test Ratings Communication and Media Crash Data Analysis Statistical, Epidemiology and Other Road Safety Research Methods	Developing a marketing strategy to increase Victorians' vehicle safety awareness and influence purchase decisions towards safer vehicles	Vehicle safety technology has seen a dramatic advancement in the past decade. However, not all models available to consumers offer the same level of safety content. Vehicle buyers tend to take safety for granted and are generally unaware of the latest technologies. Safety is usually a low-ranking factor in purchasing decisions. This paper discusses findings from a study commissioned by the Victorian Department of Transport to address current gaps in vehicle safety awareness. The research combined the power of behaviour research, data analytics and strategic marketing techniques to develop the new Victorian Government's marketing and communication strategy for vehicle safety through an evidence-based approach. Findings from the research are used to deliver targeted, compelling and cost-efficient messages to increase vehicle safety awareness and influence consumers to prioritise safety in their purchase decisions.

220	Brain, D.	Heavy Vehicles - Trucks, Buses, Hazardous Materials Workplace and Work Related Road Safety	Consignors of import containers play a critical role in preventing heavy vehicle rollover, but they're often unaware of their role.	Significant on-road incidents involving container-laden heavy vehicles are 36% more likely to result in rollover, compared to vehicles carrying general freight (NTI, 2018). A common causal factor in these incidents is load shift within the container, causing the vehicle to become unstable and roll while navigating bends or turns. Loads inside containers shift due to inadequate packing and restraint. Incident data suggests that container packing is not being sufficiently prioritised by the supply chain, and container-laden heavy vehicle rollovers continue to occur due to packing deficiencies. While the issue exists across all container movements in Australia, import containers tend to be highly represented in the data. The volume of container imports to Australia is forecast to double by 2029 (BITRE, 2019. BITRE, 2014). With >80% of container trips to/from Australian ports completed by trucks (BITRE, 2019), addressing container packing deficiencies in import containers is an essential step towards zero.
221	Sharwood, L.N. Logan, D. Scott-Parker, B.	Road Safety Programs Crash Data Collection Data Linkage Statistical, Epidemiology and Other Road Safety Research Methods	Can I have your attention please? Piloting an outcome evaluation on pre-novice driving youth aiming to determine the 'bstreetsmart' impact.	Road deaths and serious injuries among young novice drivers remain unacceptably high. They are among the most vulnerable road users in Australia; drivers 16-19 years are 6-8 times more likely to crash than those 55-59 years. Crash/injury prevention action must be multi-pronged to address the multiple factors influencing novice driver behavior and their willingness to engage in risky driver behavior. Bstreetsmart is a road-safety program targeting around 25,000 pre-driving youth across NSW annually. Despite increasing attendance, no formal outcome evaluation has previously determined the programs impact on pre and post knowledge and attitudinal changes. Engagement with this age demographic is historically challenging. Using pre-post survey methods, a smart-phone based app, teacher engagement, participation incentives, we surveyed 2630, 1000 and 178 students' pre, post and 3 months post-event respectively. Despite poor response fractions, attitudinal change was significant immediately post, with some sustained at 3 months. Full results will be presented.
222	Wagdy, A. Elhenawy, M. Masoud, M.	(ITS - roads) Intelligent Transport Systems in Road Infrastructure Road Design Road Environment	Glare safety problem in tunnels and underpasses in Australia	High Luminance variations experienced when entering and exiting underpasses may cause severe crashes due to the occurrence of glare and the black-out effect. In this study, we propose a methodology using dynamic solar reflectors to minimise the high light variations that arise over a short distance at the underpass endpoints. First, a field investigation was conducted in one underpass in Brisbane, Australia to capture High Dynamic Range Images from the Field Of View of drivers to analyse their visual experience. Then, Radiance simulation engine was used for advanced conducting advanced glare analysis on the underpass 3D model, and Grasshopper was used for parametric modelling of the dynamic solar reflectors which aimed to reduce the luminance contrast. These reflectors were optimised to smooth the sharp transition between the maximum and minimum luminance experienced at these locations. Results showed the effectiveness of the proposed method in reducing the contrast level.

223	Albanese, B. Bohman, K. Bilston, L. Cross, S. Koppel, S. Charlton, J. Olivier, J. Keay, L. Brown, J.	Child Restraints	Can specific child restraint design features improve correct use?	Ergonomic and user-friendly design features are thought to facilitate correct use of child restraints. Despite attempts at intervention, incorrect use of child restraints is widespread, and the optimal design of a child restraint to minimise incorrect use remains unknown. This body of work, comprising of three studies, aims to investigate whether targeted child restraint design can increase correct child restraint use. Incorrect use arising from errors introduced by both the child and parent/carer was investigated using naturalistic and laboratory studies. These data show that differences in child posture, belt positioning, comfort and error rates exist between restraints of varying design. To date, one specific design feature was found to be effective in reducing adult user errors during installation tasks involving the vehicle's seat belt. Together these preliminary results suggest restraint design changes have considerable potential to increase the correct use of child restraints.
224	Tyler, W.J.P. Stokes, C. Woolley, J.	Road Design Crash Data Analysis Statistical, Epidemiology and Other Road Safety Research Methods	Using in-depth accident data to identify limitations when applying crash injury risk curves	Injury risk curves outline the relationship between speed and the risk of high severity outcomes for certain crash configurations, and hence are a convenient tool for road infrastructure design practitioners when assessing the safety of certain road designs. However, aggregation of data used to create these risk curves can hide important complexities that limit their usefulness. The aim of this study is to contextualise such risk curves with respect to other determining factors of crash injury severity. In-depth crash investigation data from the Initiative for the Global Harmonisation of Accident Data (IGLAD) database is used to compare the predicted risk of high severity outcomes with actual severity outcomes of crashes. The results of this study suggest that the risk of high severity outcomes was either under- or over-predicted for a substantial proportion of crashes within the database.
225	Pinnow, J. Elhenawy, M. Masoud, M. Larue, G. Glaser, S. Rakotonirainy, A.	Crash Avoidance and Crash Severity Reduction Crash Data Analysis Crash Data Collection Crash Testing	Crashes classification in naturalistic driving scenarios using random forest machine learning algorithm	This research analyses the viability of utilising observed kinematics in machine learning models to identify safety critical events (SCE's). There is a need for efficient algorithms to idenfitify SCE's in large datasets, such as naturalistic driving studies (NDS). Typical threshold approaches, while fast, often fail to distinguish between normal driving and SCE's. The methodology proposed presents strong evidence that kinematic features used in machine learning models have good classification capabilities. Three approaches were used to analyse 100-car NDS observations: trigger threshold approach (TTA) and two machine learning methods, single point random forest model (SPRFM) and time-shift random forest model (TSRFM). The TSRFM model performed the best, followed by SPRFM and TTA respectively. The results showed that these machine learning methods can better classify crashes and non-crashes than conventional trigger threshold approaches.

227	Kong, S. Gnim, C. Him, Y.	Early Childhood Road Safety Pedestrians Speed, Speeding & Travel Speeds Statistical, Epidemiology and Other Road Safety Research Methods	Enhancing road safety knowledge and practice around rural school zone in Cambodia	Cambodia has seen a rapid increase of almost 500% in its road traffic over the last 10 years with 88% of those newly registered vehicles being motorcycles. Together, limited enforcement and improvement of the safer road engineering has led to increasing speeds resulting in more frequent serious crashes along both the national and local community road networks. Farmers, workers and students continued to be the high-risk groups of road traffic crashes contributing to 76% of total road crash fatalities in 2018. Speeding was the main cause of road crash fatalities (38%), and 68% of those were motorcyclists1. On average, at least 5 people died and 11 more were seriously injured on Cambodia's roads everyday, creating enormous impact on the social and economic welfare of the country with an estimated annual cost 400 million US$, representing about 2% of the country Gross Domestic Product (GDP)2. Adopting the national road safety action plan that aligned with the UN Decade of Action for Road Safety 2011 – 2020, road crash fatality was forecasting to halve by 50% aimed at saving 7,350 lives3. This study examines practices, measures and approaches implemented via global, regional and country sustainable best practice. Observation and assessment on community challenges, experience, socio-economy, culture, understanding, belief, commitment and cooperation among school teachers, parents, student councils and local authorities together with civil societies, private sectors and donor organisations over time were explored in this study.
226	Jurewicz, C. Hall, C.	Road Design Intersections and Roundabouts	Safe system infrastructure innovation in Victoria's safer roads program	Safe System infrastructure development progressed significantly during the past five years. Most of this development has been delivered through practitioner-led innovation. This abstract describes progress on several Safe System infrastructure innovations undertaken by Safer Roads program funded by Transport Accident Commission (TAC). These innovations include trials of signalised intersection platforms, rural side road activated intersection speed limits, compact roundabouts, and cushioned pedestrian crossings. Future innovation potential of additional designs is also discussed. The presentation will showcase how TAC-funded infrastructure innovation is expanding Safe System implementation and practitioner design choices.
231	Sutton, H. Keulen, M. Stitt, P. Le, J. Eveleigh, M. Elsley, C. Hodges, C.	Road Environment Road Safety Barriers Road Design	The Mitchell highway safer asset cross-section pilot project	In New South Wales (NSW) just over one-third of fatal and serious injury lane departure crashes between 2014 and 2018 occurred on state highways despite state highways comprising only 9.2% of all roads in NSW. Through decades of 'black-spot' style treatment programs in NSW, many of the specific road deficiencies on state highways have been addressed. Transport for NSW (TfNSW) is now addressing the remaining systemic risks that present over entire routes. Aspirational cross-sections for different road classes with supplementary guidance on selection of safer asset cross-sections have been developed and piloted on a section of The Mitchell Highway.

233	Le, J. Eveleigh, M. Tang, J. Grima, J. Rodgers, M. Mortimer, A. Kocoski, N.	Crossings (Pedestrian, School, Rail, Rural/Animal) Intersections and Roundabouts Pedestrians Road Environment	Development and Delivery of the Pedestrian Protection at Signalised Intersection Mass Action Program	The New South Wales (NSW) Centre for Road Safety (CRS) conducted a review of pedestrian safety at signalised two-phase intersections, and the impact on safety where parallel green signal for both vehicle and pedestrians traffic signal phasing is used. Specifically, the review looked at the potential introduction of Timed Pedestrian Protection (TPP) at signalised intersections to provide temporal separation of pedestrians and vehicles. The review found that TPPs had reduced the number of pedestrian crashes at intersections. Additionally, a crash reduction factor calculation based on NSW roads estimated that if TPPs were implemented on NSW roads they could reduce pedestrian crashes at signalised intersections by up to 35%. Thus, the literature review and crash reduction factor calculation suggested that replacing parallel green signal for both vehicle and pedestrians traffic signal phasing with TPPs would significantly contribute towards reducing pedestrian crashes at signalised intersection crossings.
234	Gray, P. Macatuggal, J., Torpy, D.	Bicyclists Road Safety Programs	Identifying cycling stress to inform cycling infrastructure investment	The Victorian Cycling Strategy (the 'Strategy') has a goal of 'Investing in a safer, lower-stress, better-connected network'. To achieve this, we need to be able to clearly identify locations of greatest risk of danger for cyclists, now and into the future. The Strategy requires that a level-of-traffic stress (LTS) approach is used when investing in the cycle network. The State Government lacked an evidence-based tool for targeting and prioritising investment in the cycling network. A comprehensive LTS tool has been developed that assesses on road mid-block and intersection conditions, including infrastructure, motor vehicle speeds and volumes. Further development of the tool includes user perception testing to understand LTS from a user's perspective and use this information to refine the tool.
235	Morris, S. Maliki, R.	Intersections and Roundabouts Signage & Signalisation	Raised intersections at traffic signals in Victoria	Across Victoria, 28% of deaths and 41% of serious injuries occur at intersections. In Metropolitan Melbourne, 38% of serious casualties at intersections occur at traffic signals. To address this issue the Victorian Government invested in a trail project to retrofit raised intersections at traffic signals. Raised intersections are a speed management treatment capable of reducing the operating speeds for vehicles through an intersection to Safe System collision speeds. In 2019 seven raised intersections were installed at intersections along two routes in the Thomastown area, north of Melbourne. Following installation an evaluation was undertaken which showed the changes in mean speed on the main roads, on approach to has decreased by approximately 10.7km/h. Through the development and delivery process learnings were gathered on several aspects of the treatment such as drainage, delineation, communication strategy and truck stability, and included in the update to the Road Design Note 3.07 Raised Safety Platforms.

236	Morris, S.	Road Safety Strategy	Safer roads program staged development process	The Victorian Governments Towards Zero Action Plan, released in 2016, focuses on safe system treatments including continuous barrier projects on the Victoria's Top 20 highest risk roads. The programs lead to the Safer Roads team to revise the development process to allow the large, complex projects to be delivered within the four year Plan. The previous process relied on project submissions twice a year based on comprehensive guidelines. These guidelines would take time to develop, and never cover all potential projects. This resulted in many projects being revised, wasting time and resources. The Safer Roads team developed a ten stage process, which takes projects from an initial feasibility stage to project completion. Development under this new process concentrates on a collaborative approach between project developers and funders. It has resulted in more confidence in the projects developed and has been adopted on all Safer Roads programs.
237	Zaouk, A. Strassburger, R. Fournier, R. Willis, M.	Drink Driving (ITS - vehicles) Intelligent Transport Systems in Vehicles	Driver alcohol detection system for safety (DADSS) program and technology overview	Drink driving is a factor in approximately 18 percent of all road fatalities across Australia (Drummer et al., 2018). VicHealth estimates the social cost relating to alcohol abuse in Victoria to be $4.3 billion, with road trauma accounting for 25.5% of this cost (VicHealth, 2020). To help eliminate alcohol-related road trauma and achieve zero deaths and serious injuries on Australian roads, the Transport Accident Commission (TAC) is evaluating a new and innovative vehicle technology; the Automotive Coalition for Traffic Safety's (ACTS) Driver Alcohol Detection System for Safety (DADSS) Passive Alcohol Sensor (PAS). The TAC will lead a trial of the PAS technology in Australia, complementing a suite of intelligent vehicle technologies (IVT) aimed at achieving Towards Zero. The DADSS PAS technology is a non-invasive method of measuring a driver's naturally exhaled breath alcohol concentration emitted into the air in the vehicle cabin. The PAS trial aim is to generate knowledge and technology planning to reduce road trauma associated with drink driving.
238	Rechnitzer, G. Grzebieta, R. Gaffney, T. Bugeja, L. Crozier, J.	Restraints Child Restraints Crash Data Collection	The "unseen passenger": current vehicle restraint systems are not designed for safety of pregnant women and their fetus	Pregnant women and their fetus are vulnerable road users who are not well protected in crashes. Current vehicle occupant protection systems (seatbelts, airbags) are not designed for pregnant women or their unborn child. While pregnant women are advised to wear seatbelts at all times, there is a serious risk to themselves and/or the fetus via placental abruption due to the lap-belt passing over the fetus and directly loading the foetal area in a crash, even in moderate crashes. Some insight is provided into this important neglected area of road safety and proposes action to help develop vehicle restraint safety systems for pregnant women and her fetus, the "unseen passenger".

243	Ranjbar, M. Hamelmann, C. Mooren, L. Shuey, R. Zakeri, H. Hedayati, J. Mehryari, F. Abdous, H. Mozafari, M. Hosseinzadeh, S.A. Hadadi, M. Shafieian, M.M.	Speed, Speeding & Travel Speeds Road Safety in Developing Countries General Enforcement Enforcement Programs	Demonstrating enhanced safety model corridors in Iran	In Iran, road traffic crashes are one of the five leading causes of fatalities. Unfortunately, in 2017, the downward trend in road fatalities had changed, after nearly a decade of decreases in fatalities. To reverse this trend, a project has been designed to demonstrate enhanced Safety Model Corridors based on the Safe System Approach (SSA) and Result-Based Management Approach (RBMA). The focus of this project is road safety engineering and speed limit reductions, strengthening surveillance, monitoring and evaluation, improved crash investigation, improved governance, enhanced law enforcement, social marketing, and quality improvement of post-crash care services. The scope and challenges of the project, planned actions and early achievements are discussed in this paper.
244	Pugsley, L. Khieu, P.	Early Childhood Road Safety Novice Driver/Rider Licensing Road User Training – General (Bicyclists, Workplace, OHS, Etc.) Education – general and other	An omnichannel approach: Queensland's road safety education blueprint for children and youth	Road trauma is a leading cause of death of Queensland children (QFCC, 2019). A whole-of-life approach to road safety education is required to shape and influence behavior which will drive a generational shift in the awareness of being a safer road user. The Queensland Department of Transport and Main Roads (TMR) recognizes the key role they play in road safety education and created a new Road Safety Education Blueprint for Queensland Children and Youth (the Blueprint). This Blueprint was developed through a review of literature, other jurisdictional initiatives, and in consultation with stakeholders across Queensland. This process identified pragmatic outcomes by analysing children's risk profiles and the current road safety education landscape including service providers, effective pedagogies and gaps across ages, content and geography. The result is a Blueprint articulating a vision for a continuum of evidence-based education across childhood through an omnichannel approach, supporting and enabling a behavioral shift of the current and emerging generation of safer road users.
245	Mooren, L. Shuey, R. Ranjbar, M. Mehryari, F. Shafieian, M. Hadadi, M. Hamelmann, C. Hedayati, J. Haddadi, M.	Policy Development And Implementation Road Safety Strategy Road Safety in Developing Countries	Speed management in Iran	The level of road trauma is high in the Eastern Mediterranean Region with the Islamic Republic of Iran having a particularly high rate. The Government, assisted by the World Health Organisation (WHO), has recently committed to carrying out some demonstration projects in three provinces that, if successful will form the basis of road safety actions advanced by the WHO across the Region. In recognition that speed is a pivotal factor in achieving a safe road and traffic system, a review of speed management in Iran was carried out in 2019 by a team of international experts in the field. The findings of this review and their implications for future actions are discussed in this paper.

246	Ainsworth, A. Coulson, R. Downing, N. Potter, C.	Indigenous Road Safety	Reviewing Queensland's indigenous driver licensing program	The overrepresentation of Indigenous Australians in road crash data highlights the need for the Department of Transport and Main Roads (TMR) to review and redevelop the Indigenous Driver Licensing Program (IDLP). Over the past 12 years, the IDLP has achieved excellent results providing licence access to Indigenous communities, however the focus on road safety education under this program tends to be more adhoc. By engaging and interviewing 30 key stakeholders in Indigenous communities throughout Queensland, this research and engagement activity sought to ensure initiatives implemented by TMR (and potentially other Queensland Government agencies) were effectively targeted to achieve positive road safety outcomes for Indigenous communities. Given a driver licence is a ticket to mobility and gaining a broader experience of the world, a key outcome of the work is to provide road safety education by leveraging the reach of the IDLP in key communities earlier in the licensing journey.
247	Potter, C. Downing, N.	Motorcyclists	Motorcyclist personas: it's not one size fits all	There is support in the motorcycling community for road authorities to reconsider their approach to managing the safety of motorcyclists that accounts for the breadth of the market, as well as the differences in motivations for riding. Using a customer-centric approach, the Department of Transport and Main Roads (TMR) undertook research to understand the segments of the motorcycling community and identify different ways to engage with the community using a tailored approach.
264	Lim, H.	Road Environment	Audio tactile line-marking - mass action development and delivery	Victoria's audio tactile line-marking (ATLM) program has provided a systematic approach to the reduction of run off and head-on crashes on high risk roads. Tools and strategies were identified and utilised to ensure that benefits are realised earlier. By using rich datasets, simplifying the specification and promptly applying lessons learnt, the program was more cost effective, quicker and simpler to deliver while still treating 65% of the undivided arterial road network.
21-19	Mills, L. Freeman, J. Davey, J.	Drug Driving Drug Testing	Twelve years of roadside drug testing in Queensland: the extent and nature of recidivism	Driving with any trace of illicit drugs in one's system is against the law in all Australian jurisdictions yet thousands of offenders are detected every year through police-lead Roadside Drug Testing (RDT) operations. The results of RDT offer important insight into the nature of drug driving, however, there has been limited research evaluating the extent of drug driving recidivism. To explore this, a dataset of 67,727 drug driving offences from the Queensland Police from December 2007 to June 2020 was analysed. The results identified 50,442 unique offenders, with 25% of these offenders being detected more than once. For one-time offenders, cannabis was the most common detection. Methamphetamine was the most common drug analysis result detected across all offences, and for recidivist offenders. The results illuminate the need to explore the utility of countermeasures which focus on maximising the deterrent effect of RDT operations, and reducing offending of those already detected.

21-20	Pushka, A. Milligan, C. Turner, S.	Road Design Intersections and Roundabouts Road Safety Audit and Road Safety Review Road Safety Strategy	Comprehensive safety assessments and rapid evaluations using video analytics and conflict data: innovative approaches from North America	Towards Zero is focused on eliminating fatal and serious injury (fsi) collisions on the transportation network. Despite recent publications exploring innovative intersection design concepts following Safe System principles, there remains the need to effectively evaluate safety treatments prior to large-scale application. Video analytics and conflict data has been effectively used in North America and Europe to complete comprehensive risk assessments prior to capital investment and for rapid subsequent safety performance evaluations. In many cases this application of technology has identified latent high-risk factors previously unknown from collision data, and follow-up evaluations of safety implementations have resulted in 80-100% reductions in critical- and high-risk conflict events that are most likely to result in fsi collisions. Widespread implementation of video analytics technology with risk severity thresholds based on human impact tolerance will enable a quantitative understanding of safety measure performance, accelerate adoption of safer intersection designs and provide justification for safety investments.
21-21	Steinmetz, L. Lim, E.H.	Speed, Speeding & Travel Speeds Road Design Road Safety Programs Crash Data Analysis	Implementation and evaluation of area 40 in Maribyrnong – findings and lessons to date	As part of Council's Safer Local Roads program, Council has commenced implementation of 40 km/h area speed limits throughout the municipality. The City was divided into 7 areas where the sequence of Area 40 implementation generally aligns with the Local Area Traffic Management Program. To date, reduced limits have been implemented in 5 out of 7 areas – the Seddon and Yarraville precinct (Area 2), Footscray (Area 1), Kingsville (Area 3), Braybrook, Maidstone and West Footscray (Areas 4 and 7). Post-implementation evaluation forms part of this overall program. This paper presents the approach and the results of the evaluation for the first Area 40 in Seddon and Yarraville. The short-term evaluation (undertaken less than 12 months after the treatment implementation) provides insights into impacts the speed reductions have had on safety, driver behaviour and operations.
21-22	Turner, S. Sobhani, A. Wood, G. Persaud, B.	Crash Data Analysis Statistical, Epidemiology and Other Road Safety Research Methods	Improving the evaluation of Victoria's road safety program	Before and after evaluations of road safety infrastructure programs provide valuable feedback to transport departments on how effective their programs have been in reducing deaths and serious injuries. With the goal of Vision Zero it is more important than ever to understand which programs and projects are effective and those which are not. The Victoria Department of Transport have been doing evaluations of their extensive road safety programs since the 1990's. A review of the program evaluation business requirements and the methodologies that have been used to undertake previous evaluations has identified some shortcomings and potential improvements. There are best practice methods used in other countries, and especially in North America, that have been shown to provide more robust evaluation results. This study recommended changes in the statistical methods used in future evaluation studies, including use of the empirical Bayes method.

21-23	Silvester, D. Davies, R. Sobhani, A.	Road Safety Audit and Road Safety Review Crash Data Collection Crash Data Analysis Statistical, Epidemiology and Other Road Safety Research Methods	The effectiveness of the safer roads infrastructure program stage 3 (SRIP3)	This paper outlines the evaluation of the effectiveness of the Safer Road Infrastructure Program Stage 3 (SRIP3). This $532 million road safety improvement program was implemented across 764 sites in Victoria between 2007 and 2017. The statistical analysis method used a before and after study of crashes using comparison regions to assess the reduction in casualty and serious casualty crash rates for the overall program and for various project types. Where appropriate, the efficacy of various treatment types was also assessed. The evaluation found a 27% reduction in fatal and serious casualties resulting from the implementation of the SRIP3 program, resulting in a benefit-cost ratio of 2:1. Over the expected lifetime of the projects, this corresponds to a reduction of 8300 casualties, including 3200 fatal or serious casualties. Recommendations on continuous improvement on quality of data collection and analysis are made for future evaluations.
21-24	Walker, S. Cooper, T. van Agtmaal, N. Wescombe, A.	Road Environment Statistical, Epidemiology and Other Road Safety Research Methods	Safer roads black audio tactile line marking short term evaluation	Black Audio Tactile Line Marking (ATLM) has been implemented on a range of rural roads as a component of the Safer Roads programme. ATLM is intended to reduce serious casualties caused by head-on and run-off-road crashes. A longitudinal analysis was conducted to determine if any significant change had occurred across four treatment sites and six control sites. The collection of traffic data included Automatic Traffic Counts (ATCs) and video camera surveys to observe driver speed behaviour and lane placement. The camera survey sites provided the most tangible evidence that the Black ATLM treatment is effective at modifying driver behaviour. Lane positioning variability significantly reduced in at least one direction at the treatment sites, compared to none at the control site. Similarly, duration of lane encroachment and passing vehicle separation had some significant results at the treatment sites, however more data is needed to verify the ATLM impact on these variables.

21-25	Davy, S. Cairney, P. Lawrence, B. Fildes, B.	Speed, Speeding & Travel Speeds Road Environment Road Design Intersections and Roundabouts	Short-term evaluation of raised safety platforms: a preliminary analysis based on vehicle speeds	Raised Safety Platforms (RSPs) have been installed to reduce the speed of traffic entering intersections with a view to reducing fatal and serious injury (FSI) crashes. A before and after study with control sites was used to compare traffic performance prior to and after the installation of RSPs at treated intersections along two arterial routes. Statistically significant reductions in speed were found at all treated intersections, and in most cases these reductions were substantial. After treatment and adjusting for changes in the control group, there was an 80% reduction in the odds of a vehicle on the main road exceeding the Safe System threshold of 50 km/h for cross-traffic collisions - the percentage of vehicles exceeding this speed reduced from 32% to 7%. There was also a 46% reduction in the odds of exceeding 30 km/h. Crash reductions estimated on the basis of the speed reductions were 24% for vehicle to vehicle crashes. Substantial reductions in the risk of injury to vulnerable road users and other dominant crash configurations were also identified. It was concluded that RSPs were an effective countermeasure for intersections, and that they could be used in similar situations with confidence, but long-term monitoring was required to determine their crash reduction factor based on real crashes.
21-26	Turner, S. Alavi, H. Sobhani, A.	Policy Development And Implementation Crash Data Analysis Statistical, Epidemiology and Other Road Safety Research Methods	Developing safe system projects and programs using safety science methods	The Victorian Safer Roads program strives to eliminate road traffic fatalities and serious injuries across the State through the cost-effective implementation of safe system compliant road safety infrastructure and speed management programs and projects. To maximise the benefits of the Safer Roads program it is important that any safety countermeasures are well targeted to the highest risk sites and routes. This relies on using statistically robust methods in both site selection and project appraisal, that adequately account for statistical variation in crash data. This study identified the gaps/weaknesses in the current road safety project and program development methods used by Safer Roads and assessed the various options that are available to address these shortcomings. This study established the need to move away from relying solely on historical crash data and a move towards the empirical Bayes method, that use both historical crash data and predictive crash analysis methods, based on safety performance functions (SPFs) and crash modifying factors (CMFs). This preferred method is often referred to as the safety science, or the USA Highway Safety Manual (HSM), approach.

21-30	Mustafa, M. Bakar, H. Mohammad, M.Z. Azmi, E.A. Ja'Afar, M.S. Ibrahim, A.	Driver Risk Workplace and Work Related Road Safety Road Safety Programs Education – general and other	Vision zero for P-Hailing riders: understanding work demands and unsafe work behaviours	Looking at worrying trend of accidents among p-hailing riders, which refers to the delivery of parcels and food via online applications using motorcycles, it is essential for us to set out strategy to curb the accidents. As part of Malaysia's Vision Zero Program, this study identifies the roles of working conditions in influencing their safety risks and examines how safety becomes riders' top priority. An online survey was conducted and the results of 100 respondents showed that the desire to get attractive income has forced them to work long hours with insufficient rest time and persuade them to violate traffic rules more often. Besides, the riders ride dangerously at peak hours to avoid negative response from customers. The findings will be used as baseline information for conducting training to increase riders' safety awareness in line with the government strategies on regulating the service under existing laws.
21-32	Trivedi, P. Shah, J.	Road Safety in Developing Countries Crash Data Analysis Data Linkage Statistical, Epidemiology and Other Road Safety Research Methods	Identification of road accidents severity ranking by integrating the multi-criteria decision making approach	This research aims to advance a novel road accident severity ranking integrating the injuries types. The injury severity data of 29 numbers of Indian states (i.e. Andhrapradesh, Arunachal Pradesh, Bihar, etc.) for the year 2019 was incorporated to formulate the severity ranking by using Multi-Criteria Decision Making (MCDM) methods. Analytical Hierarchy Process (AHP) and Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) methods were taken into the application for research synthesis. The integration of MCDM methods incorporates the injury severity data with the ranking analysis. Further analysis proved the validity of the proposed research by collectively analyzing the variety of injury severity data within the single ranking approach, which often analyzes individually. Therefore to develop a novel approach, this research is resulted with great accuracy and has a great potential for reforming the conventional severity ranking practice.
21-47	Lindner, H. Clarkson, E. Black, M.	Advocacy Child Restraints Crash Testing Safer Transport & Mobility	Safety for all: building an evidence base to support safe vehicle transport for children with disabilities and medical conditions	Recent research shows lack of improvement in the transportation of children with disabilities, noting they 'continue to be inappropriately restrained in vehicles, constituting an ongoing road safety problem.'. Mobility and Accessibility for Children in Australia (MACA) was established in 2019 to close this gap. MACA initiates research and develops policies, resources, and programs to empower a whole of system approach to meeting the transport needs of children with disabilities and medical conditions. This presentation will include key findings from MACA's national survey, undertaken by Curtin University. The largest and most comprehensive survey of its kind in Australia, the findings reveal stark road safety challenges for families and children with disabilities and medical conditions. It will also introduce MACA's new Australian Safety Assessment Program, funded by the TAC and supported by NeuRA and Britax. This world leading program develops information and prescribing advice based on assessment (including sled-crash testing) outcomes.