

# Reducing speed, improving safety: Case Study

Road traffic injuries are a leading cause of morbidity and mortality globally and road crashes have a considerable cost for the community, including for families trying to cope with the death or disability of a family member involved in a road crash. Through the Road Accident Research Unit (RARU) at The University of Adelaide - now the Centre for Automotive Safety Research (CASR) - NHMRC-funded research led to reductions to speed limits and other innovations that have made important contributions to road safety in Australia.



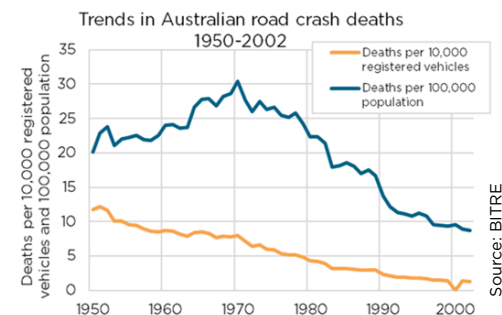
## Origin

In September 1960, a Senate Select Committee on Road Safety reported that 9,035 people had been killed in road accidents in Australia in 1957-58, and that the estimated cost of these accidents was over £69 million (or over \$2.2 billion in 2020 dollars).<sup>1</sup>

In a submission to the Committee, Professor James Robertson, a member of NHMRC's Medical Research Advisory Committee and Professor of Pathology at The University of Adelaide, stated that "the systematic study of accidents... is now a matter of urgent national importance".

The Government agreed and before the end of that year had established the Australian Road Research Board (ARRB).<sup>2</sup> In addition, NHMRC formed a Traffic Injury Committee (TIC) which, guided by Professor Robertson, commenced work to improve national collection of traffic accident data. In 1963, NHMRC accepted the recommendations of the TIC that "properly designed, standardized, [seat belt] anchor points be a requirement in all new cars".

Meanwhile, the rate of road fatalities in Australia continued to increase. By 1970, Australia had the third highest fatality rate (per 100,000 population) in the world.<sup>3</sup>



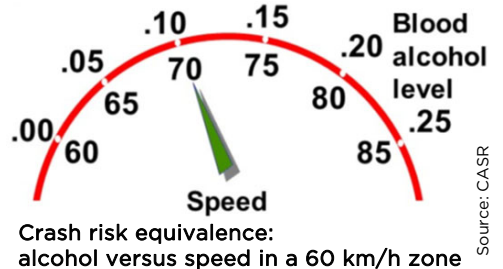
## Investment

The TIC resolved that intensive studies were needed to investigate fatal and hospitalisation accidents. From 1962-1967, NHMRC funded traffic injury research undertaken by Royal Brisbane Hospital neurosurgeon and TIC member Dr KG Jamieson. Robertson also formed a unit for this purpose, consisting of an engineer (Jack McLean) and a physician (Dr Tony Ryan).

From 1962-1965, sponsored by the ARRB, the unit conducted at-scene investigations of a representative sample of injury-producing road crashes. Published in 1965, it was the first crash study to show that pedestrians were run under, not over, by the striking car and that the design of the front of the car was a critical factor in pedestrian protection.<sup>4</sup>

From 1968-1971, NHMRC funded research at Monash University undertaken by Ryan and Dr Peter D Clark on the emergency care of traffic accident victims. Meanwhile, McLean undertook automotive crash injury research at Cornell University and studied and taught at the Harvard School of Public Health.

McLean returned to Australia in 1973 to establish RARU and design a major at-scene study. In 1980, after a call for submissions from NHMRC, the unit became NHMRC-funded. With periodic reviews, this funding eventually extended from 1981-1998.



## Research

RARU undertook world-first research to quantify the association between travelling speed and the risk of casualty crash involvement in an urban area. It also undertook research to quantify the risk of crash involvement with blood alcohol level. This research, published in 1997, showed that:

- the risk of involvement in a casualty crash approximately doubles with each 5 km/h increase in travel speed above 60 km/h
- if none of the crashed vehicles in the study had been travelling above 60 km/h, nearly 50% of the casualty crashes would have been avoided or reduced to non-casualty crashes
- speeding in an urban area is as dangerous as driving with an illegal blood alcohol concentration (BAC); even travelling at 65 km/h increases the risk of crash involvement as much as driving with a blood alcohol concentration of .05%<sup>5</sup>

RARU researchers investigated how head impacts relate to patterns of brain injury and aspects of this work challenged the prevailing paradigm of brain injury mechanisms. The Japan Automobile Research Institute initiated its first non-Japanese research agreement with RARU in the area of brain injury biomechanics.

In 1979, RARU published research analysing collisions at uncontrolled intersections.<sup>6</sup> This was important as accidents at intersections then accounted for 45% of all road casualties in Australia.<sup>7</sup>

In 1987, and at the request of the South Australian Government, RARU undertook research on the effectiveness of that state's random breath testing program. Other RARU research investigated motorcycle helmet design, pedestrian protection through vehicle design and the crashworthiness of light vans.

## Results and Translation

In 1964, NHMRC recommended to Australian governments that seat belt anchor points should be standard on all new vehicles sold in Australia. Compulsory seat belt legislation was subsequently introduced in Victoria (in 1971) followed by other states and territories. This legislation was of world-wide significance and its success aroused interest for similar legislation in many countries.<sup>8</sup>

RARU's at-scene research on car crashes, partly funded by the Australian Government Department of Transport, demonstrated the dangers of the 'Give Way to the Right' rule, which was widely in force across Australia until the early 1980s. By 1992, this rule was entirely discredited.<sup>9</sup>

Commencing in 1997, 50 km/h limits on local roads in built-up areas began to be introduced extensively across Australia. In 2001, the National Road Transport Commission (NRTC) recommended national adoption of this policy, directly referring to RARU's 1997 research as justification.<sup>10</sup>

In June 2003, the Australian Transport Council (ATC) approved amendments to the Australian Road Rules to include a national default speed limit of 50 km/h in built-up areas.<sup>11</sup>

RARU's work on international design standards informed the development of both Japanese and European standards for pedestrian safety.<sup>12</sup> This work has been continued by CASR and its ongoing research in this area is relevant to the regulation of vehicle design through the United Nations Economic Commission for Europe (UN/ECE) Global Technical Regulations.

In 1988, RARU was designated as a World Health Organisation (WHO) Collaborating Centre for the Prevention and Control of Road Traffic Accidents, one of only two such centres in the world.

## Health Outcomes and Impact

From 1925-1979 in Australia, over 100,000 road users were killed and 2.2 million injured.<sup>13</sup> By 1979, total annual road deaths had begun to fall and that decline has, by and large, continued up to the present time.<sup>14</sup>

This decline has been the cumulative result of a variety of factors including introduction of seat belts, random breath testing (RBT) and changes to vehicle and road design and infrastructure. However, during the past 30 years a key causal factor has been reductions to speed limits. As a result of lower urban speed limits, fatalities on metropolitan roads halved in Victoria, fatal crashes were reduced by 37% in Western Australia<sup>15</sup> and there was a 26% reduction in casualties in South Australia.<sup>16</sup>

By 2006, the move to a 50 km/h speed limit was estimated to have led to financial savings nationally of over \$1.5 billion per year, in addition to the societal benefits from major reductions in death and disability from road crashes.<sup>17</sup> RARU's research also led to reductions in the speed limit of rural roads in South Australia and other states from 110 km/h to 100 km/h, with a resultant reduction of casualty crashes of about 20%.<sup>18</sup>

RARU's research has helped contribute to car frontal shapes today being much safer for pedestrians than they were 40 years ago.

This work continues. In July 2003, RARU was incorporated into a new Centre for Automotive Safety Research (CASR) at The University of Adelaide and secured ongoing funding from the South Australian Government. The level of pedestrian protection provided by current model vehicles is assessed in the CASR Vehicle Testing Laboratory as part of the Australasian New Car Assessment Program (ANCAP).



### Prof Jack McLean

Emeritus Professor Alexander John McLean received Bachelor and Masters degrees in Engineering from The University of Adelaide, and from Harvard University; a Master of Science in Environmental Health and a Doctor of Science in Epidemiology and Biostatistics. He was Director of RARU from 1973-2008.

Professor McLean is an Honorary Member of the International Council on Alcohol, Drugs and Traffic Safety and served as its President from 1995 to 1997. He was a member of the Global Traffic Safety Trust and the work of this group was recognised with the Volvo International Traffic Safety Award in 1988.

### Prof James Robertson

Professor James Struan Robertson (1916-1983) graduated in medicine from The University of Sydney in 1939. In 1946, he commenced doctoral studies at Oxford, supervised by Sir Howard Florey. In 1949, he became Professor of Pathology at The University of Adelaide.

### Dr Kenneth Jamieson

Dr Kenneth Grant Jamieson (1925-1976) was a leading Australian neurosurgeon. In 1948, he joined The Royal Melbourne Hospital. In 1956, he was appointed as Queensland's first neurosurgeon. He also worked as a researcher at the Baker Medical Research Institute.

### Craig N Kloeden

Craig Kloeden has been a research fellow at RARU/CASR since 1987. His research has included quantifying the relationship between speed and injury crash risk, evaluating speed limit reduction countermeasures, analysing vehicle speeds and examining the crash experience of young drivers.

### Dr Robert WG Anderson

Dr Robert Anderson was Deputy Director at RARU and then CASR. He is now a director and principal of Anderson Hall Pty Ltd, providing crash investigation, accident reconstruction and forensic engineering services to the legal and insurance industries.

### Dr G Anthony Ryan

Dr Tony Ryan was Deputy Director of RARU (1987-93) and Director of the Road Accident Prevention Research Unit at The University of Western Australia (1993-2000). He was also a consultant to the WHO (1987-2000) for emergency medical services and road crashes.

### Dr Matthew RJ Baldock

Dr Matthew Baldock is Deputy Director of CASR. His research has focused on in-depth crash investigation, impaired driving, motorcycle safety, heavy vehicles, unlicensed driving, driver distraction, level crossings and older and young drivers.

### Prof Peter Blumbergs AO

Professor Peter Blumbergs is a clinical neuropathologist who since 1999 has been based in the Department of Anatomy and Pathology at The University of Adelaide. From 2004-2013 he was Head of the Centre for Neurological Diseases at the Hanson Institute.

### Prof Donald Simpson AO

Professor Donald Adrian Allen Simpson (1927-2017) was a neurosurgeon at Royal Adelaide Hospital. He was Director of Paediatric Neurosurgery at the Adelaide Children's Hospital (1970-1985) and Chair of the Neurosurgical Research Foundation (1994-2004).

### A/Prof Jeremy Woolley

Associate Professor Jeremy Woolley is Director of CASR. In 2018, he co-chaired an inquiry into the National Road Safety Strategy and was made a Fellow of the Australasian College of Road Safety. He works to influence road safety strategies and policies internationally and in Australia.

### Andrew van den Berg

Andrew van den Berg manages the CASR Vehicle Testing Laboratory. This includes ANCAP pedestrian impact testing of new cars, with regular interaction with laboratories in the EU and the Japan Automobile Research Institute, and the experimental reconstruction of pedestrian impacts.



Australian Government

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## References

This case study was developed with the direct assistance of Professor Jack McLean, The University of Adelaide.

The information and images from which Impact Case Studies are produced may be obtained from a number of sources including our case study partner, NHMRC's internal records and publicly available materials.

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