Research and Data Analysis on Road Safety in Australia: A Focus on Vulnerable Road Users and Education

Executive Summary

In Australia, of the 1,310 people killed in road crashes in the 12 months to June 2024, 12.6% (165 deaths) were pedestrians, 21.1% (277) were motorcyclists and 2.6% (34) were cyclists.

Road safety is a multifaceted public health and policy challenge in Australia, directly affecting the lives of thousands of individuals annually.

Among those most impacted are vulnerable road users (VRUs), a diverse group including pedestrians, cyclists, motorcyclists, children, and older adults. These groups face distinct risks due to their lack of physical protection, reliance on shared spaces, and, in some cases, limited awareness or physical ability to respond to road dangers.

Despite the advancements in vehicle safety technologies and infrastructure, data shows a worrying trend: VRUs remain disproportionately affected by road trauma. In 2022, they represented nearly 35% of all road fatalities, with pedestrians and cyclists alone accounting for significant portions of the overall burden of road trauma.

The rise in active transport modes post-pandemic and increasing urbanization have compounded these risks.

To address these challenges, education emerges as a cornerstone for change. A robust and inclusive approach to road safety education can empower individuals with the skills and knowledge to reduce risks, complementing infrastructure upgrades and policy reforms.

This report highlights the significance of focused research, data analysis, and innovative educational initiatives as pivotal tools to enhance road safety for VRUs.

This report examines:

- Recent data on road trauma involving vulnerable road users.
- The role of education in fostering road safety awareness.
- Recommendations to integrate research, education, and infrastructure to achieve better outcomes.

Key Recommendations:

- Expand age-specific and culturally tailored educational initiatives.
- Prioritize infrastructure investments in high-risk urban and rural zones.
- Leverage emerging technologies to enhance safety for vulnerable road users.

Introduction

Road safety is more than a public health concern; it is a shared societal responsibility that requires collaborative action among policymakers, educators, and communities. In Australia, road trauma remains one of the leading causes of preventable death, injury and disability, incurring significant economic and emotional costs.

Current Landscape

Annual Fatalities: Around 1,200 people lose their lives on Australian roads each year, with a further 40,000 sustaining serious injuries (Australian Bureau of Statistics, 2023).

Vulnerable road users, such as pedestrians, cyclists, and motorcyclists, are particularly at risk because they lack the physical protection that enclosed vehicles provide. When involved in collisions with vehicles, road furniture, or the road surface itself, these users are significantly more susceptible to severe injury or fatality.

The likelihood of fatal outcomes for vulnerable road users increases dramatically with vehicle speed. Research indicates that a pedestrian or cyclist struck by a vehicle traveling at 30 km/h has a 10% probability of being killed, but this probability surges to over 90% at 50 km/h (as supported by Australian research on injury probabilities in specific crash types).

In 2020, Motorcyclists, pedestrians, and cyclists collectively accounted for a third of Australia's road fatalities. The proportion is even higher when considering serious injuries, representing nearly half of all such incidents.

The fatality rate for motorcyclists is approximately 30 times higher per billion vehicle kilometers travelled compared to vehicle occupants. In 2020, half of motorcycle deaths occurred on roads with speed limits of 100–110 km/h.

Most pedestrian fatalities involved collisions with light vehicles, with children and the elderly being particularly at risk. In 2020, the majority of pedestrian deaths occurred in 50–60 km/h zones, with around 25% happening at intersections.

Similarly, half of cyclist deaths occurred in 50–60 km/h zones, and 56% were at intersections. Around 25% of cyclist fatalities occurred on high-speed roads (90 km/h and above), with a quarter involving collisions with heavy vehicles.

There was a total of road deaths during the month of October 2024, higher than the average for October over the previous five years. In the 12 months to the end of October 2024, Australia recorded road deaths, higher than the same 12-month period ending October 2023.

Motorcyclist deaths increased by 4.9 %compared to the same period from 1 January - 31 October 2023 (222 in 2024 vs 199 in 2023). Deaths among children aged 0-7 remain at an alarming increase of (18 in 2024 vs12 in 2023).

Road crashes cost the economy an estimated $30 billion annually, reflecting healthcare expenses, loss of productivity, and the long-term impact on families and communities.

These figures underscore the critical need for targeted measures to protect vulnerable road users, including speed management, infrastructure improvements, and tailored safety campaigns.

While advancements in vehicle safety, such as autonomous emergency braking and crash-avoidance systems, have contributed to reducing motor vehicle occupant fatalities, these measures often do not extend the same level of protection to VRUs.

Vulnerable Road Users

1. **Children**

Australian children are the most vulnerable road users of all.

Land transport incidents are the leading cause of death among children aged 1–14. Nationally and across all jurisdictions, young people aged 15–24 have the highest rates of serious injuries from these incidents.

Indigenous and Non-Indigenous Impact: Between 2015–2017, road transport accidents accounted for 31% of injury deaths among Indigenous children aged 0–14 and 29% among their non-Indigenous counterparts.

The Australian Road Deaths Database reported 34 road transport-related deaths among children aged 0–14, equating to 0.7 deaths per 100,000 children. Boys were slightly more likely to be victims than girls, with children aged 10–14 having the highest death rate (0.9 per 100,000). Deaths among children aged 0-7 remain at an alarming increase of (18 in 2024 vs. 12 in 2023).

Modes of Involvement: Of child fatalities in road transport incidents, 59% were passengers, 29% pedestrians, and 5.9% pedal cyclists.

In addition, the risk to children can be as close as the family driveway.

Children's natural curiosity and quick movements, combined with the busy routines of families, often create situations where kids are at risk of injury from vehicles. Tragically, one of the most dangerous scenarios involves vehicles starting to move, particularly in driveways.

To highlight the scale of the risk, the blind spot in some family vehicles can extend over 15 meters—a space large enough to hide 60 young children. This invisible zone

creates a perilous situation where children can be struck by reversing vehicles, even when parents or caregivers are present.

Key Facts About Low-Speed Runovers:

Kidsafe has undertaken a significant amount of work in this area. They have stated that:

- Many incidents involve reversing vehicles, though forward-moving cars can also pose risks.
- These accidents frequently occur in driveways at the child's home, with the vehicle often being driven by a parent or someone familiar.
- Fatalities are most prevalent in children aged 12–24 months, with boys being more affected than girls.
- Risk increases with driveways longer than 12 meters, those along property boundaries, curved layouts, or those shared with neighbours.
- Incidents are most likely to happen during early morning (6–9 AM) and late afternoon (3–5 PM).
- Children under 4 years old are especially vulnerable.

These statistics underline a pressing road safety issue with far-reaching personal, community, and social repercussions. It is imperative to intensify road safety efforts through a comprehensive and inclusive educational framework to mitigate these devastating outcomes.

2. **Cyclists and Pedestrians:**

Recent studies have highlighted that cyclist fatalities in Australia have shown no significant reduction between 2010 and 2020. Additionally, pedestrian fatalities have seen only marginal improvement, with COVID-19 lockdowns temporarily reducing numbers during 2020–2022. This highlights a need for long-term strategies to improve safety for non-motorized road users. Recent research highlights the critical need to address pedestrian and cyclist safety as urban areas evolve toward more sustainable and active transport modes. Both groups face unique risks that require tailored strategies for effective safety interventions.

Pedestrians are particularly vulnerable in vehicle collisions, where the primary impact with the vehicle often causes severe injuries. Cyclists, on the other hand, frequently encounter risks not only from vehicles but also from shared paths with pedestrians. Studies from Finland indicate that shared pedestrian-cyclist pathways experience higher crash rates and frequent near-miss incidents, emphasizing the need for better infrastructure planning.

Notably, collisions often result in pedestrians sustaining more serious injuries compared to cyclists, due to factors like head impacts during falls

In Australia, research by Monash University Accident Research Centre (MUARC) underscores the importance of reducing speeds in shared zones and implementing dedicated lanes to prevent conflicts. Lower speeds, as recommended by some studies, may help minimize injury risks but must balance practicality for commuting cyclists. MUARC's studies also advocate for educating both pedestrians and cyclists on shared path etiquette to reduce conflicts

Targeted safety campaigns and urban planning reforms, such as clearly segregating pedestrian and cyclist pathways or installing traffic-calming measures in high-interaction zones, could substantially reduce collision risks. Furthermore, addressing psychological factors, such as the perceived versus actual risks of using shared spaces, could improve compliance with safety rules and encourage active travel modes.

Enhancing road safety for pedestrians and cyclists not only protects vulnerable road users but also supports broader public health and environmental goals.

3. **Motorcycle Riders:**

Motorcycle riders face unique challenges on the roads, making them one of the most vulnerable groups among road users. Despite accounting for a smaller percentage of vehicles, motorcyclists are significantly overrepresented in fatal and serious injury crashes.

Addressing these risks requires a multifaceted approach grounded in the latest research and best practices.

Motorcycles inherently offer less protection compared to cars, and riders are exposed to higher risks of severe injuries during crashes. Common risk factors include speeding, riding without proper protective gear, and engaging in risky behaviors such as reckless overtaking. In addition, environmental factors like poor road conditions and low visibility further heighten crash risks for motorcyclists.

Research highlights the importance of proper training, with experienced riders demonstrating significantly lower crash rates.

However, younger and less experienced riders, especially those operating high-powered bikes, are at a greater risk. Alcohol and drug use also remain critical issues in motorcycle safety, with impaired riders being disproportionately involved in fatal incidents.

The older or returning rider is also a group of concern. While older riders have a lower crash rate than younger riders, the huge growth in the numbers of older riders has increased the number of crashes involving this group.

Research highlights some critical considerations for this group, with findings showing that older riders face a higher risk of serious injuries in crashes, primarily due to the physical and cognitive changes that accompany aging.

While they tend to be more cautious and experienced than younger riders, their injuries often involve more severe outcomes, such as internal organ damage, muscle or tendon injuries, and longer hospital stays

In addition to the biological factors, returning riders may also face challenges related to skills degradation after a period away from riding. Research indicates that older riders often display lower crash rates per vehicle kilometre travelled (VKT) compared to younger riders.

However, this is not an indication that they are immune to risk. Older riders are more likely to crash in rural areas, which may be linked to factors such as lower road lighting, longer response times for medical help, and more complex road environments

Training and tailored safety education are key strategies in improving outcomes for this group.

Evidence suggests that older riders, especially those returning to motorcycling after a break, benefit from refresher courses that focus on both their physical abilities and the dynamic nature of modern road environments. These programs often emphasize hazard perception, updated road rules, and riding techniques that can mitigate risks

Australian motorcyclist fatalities remain higher than in countries like Canada and the USA but are comparable to European nations. Research emphasizes the role of risk-taking behaviors, which contribute to approximately half of fatal motorcycle crashes.

As at the time of writing, motorcyclist deaths have increased significantly compared to the same period from 1 January - 31 October 2023 (222 in 2024 vs. 199 in 2023).

4. **e-Scooter Users:**

Injuries among e-scooter riders, particularly falls, have been a growing concern. Studies in Brisbane indicate that younger adults (ages 20–34) are most frequently injured, prompting the need for safer infrastructure and regulations.

Electric scooters (e-scooters) have become a popular mode of transport, offering a quick, eco-friendly alternative to traditional vehicles. However, as their use grows, so

do concerns about safety, particularly with rising injury rates. Research has highlighted several key risks e-scooter riders face, especially in urban environments.

One of the primary safety challenges for e-scooter riders is their tendency to ride on sidewalks and footpaths. Studies have shown that a significant number of injuries occur while riders are on sidewalks, with some collisions involving pedestrians.

This raises a safety issue not only for riders but also for those walking in public spaces. Injuries can range from minor bruises to severe head trauma, and while helmets help reduce the severity of injuries, they are rarely worn by some riders.

A major contributing factor to these accidents is the lack of protective infrastructure. E-scooter riders often navigate through areas with inadequate bike lanes or poorly maintained roads, such as cracks and potholes, which are a leading cause of falls.

Unlike cyclists who are seated and may have better stability, e-scooter riders, due to the standing position, are more vulnerable to sudden jolts and instability.

It is also important to draw some distinctions from the unregulated world of private scooters to the regulated commercial ride scooters. Commercial e-scooters are equipped with a range of safety features that are typically not found on private e-scooters.

These features are designed to enhance safety for a broader group of users and mitigate the risks associated with shared, public use. Some of these safety features include:

Geofencing: Commercial e-scooter providers use geofencing technology to create virtual boundaries around certain areas

Speed Control: Commercial e-scooters often have built-in speed restrictions that can be adjusted based on the location. This helps manage speed in crowded urban areas or places where higher speeds could increase the risk of incidents.

Location and Monitoring via App: E-scooter rental services generally track their scooters' locations in real-time using GPS and provide safety features such as emergency alerts.

Robust Design: Commercial e-scooters are often designed to be more durable, with reinforced frames and components to withstand the rigors of frequent use by different riders.

Helmet Use Protocols: Commercial e-scooter providers have policies in place requiring riders to wear helmets, and they provide helmets. While these policies are not always followed by riders, the requirement helps encourage helmet use, which is a key safety measure.

Objective of the Report

This report explores road safety through two primary lenses:

1. Vulnerable road users and the factors contributing to their disproportionate risk.
2. The role of education in equipping individuals and communities to proactively address these risks.

By examining the latest data and highlighting evidence-based strategies, this report aims to provide actionable insights for improving road safety outcomes.

Road-related fatalities and injuries remain alarmingly high in Australia. While motor vehicle occupants have benefited from advances in vehicle safety, those outside vehicles—pedestrians, cyclists, and motorcyclists—remain exposed.

Children and older adults face unique risks due to their physical and cognitive limitations.

- Annual Fatalities: Approximately 1,200 road deaths annually, with a 20% rise in fatalities involving vulnerable users in the last decade.
- Cost of Road Trauma: Estimated at $30 billion annually, encompassing healthcare, emergency response, and loss of productivity (Bureau of Infrastructure and Transport Research Economics, 2023).

This report delves into how evidence-based education and policies can mitigate these risks, aligning with the National Road Safety Strategy 2021-2030, which aims to halve road fatalities by 2030.

Vulnerable Road Users: Key Insights and Trends

Definition and Scope

Vulnerable road users (VRUs) include:

- Pedestrians: Lacking physical protection, they face risks from speeding vehicles, poor visibility, and insufficient pedestrian crossings.
- Cyclists: Increased cycling activity during the pandemic has been accompanied by a rise in fatalities due to inadequate bike lanes and unsafe interactions with vehicles.
- Motorcyclists: With only 5% of road users being motorcyclists, they account for nearly 20% of fatalities. Their exposure and instability contribute to higher injury severity.
- Children and Older Adults: Children are at risk due to limited peripheral vision and impulsive behavior, while older adults face challenges such as slower reaction times and mobility issues.

Data Analysis

Pedestrian Risks: Over 70% of pedestrian fatalities occur in urban areas, with jaywalking distraction, and vehicle blind spots being significant contributors.

Cyclist Incidents: Cyclist deaths rose by 10% between 2020 and 2022, often due to collisions with motor vehicles in high-traffic areas.

Motorcycle Accidents: Most occur on rural roads, where high-speed limits exacerbate risks.

Case Study: E-Scooter Safety

E-scooters, increasingly popular in cities, have introduced new risks. In Brisbane, a 2023 report found that 35% of e-scooter injuries involved collisions with pedestrians or stationary objects. Education and helmet mandates could significantly reduce these incidents.

It should be noted that in August of 2024, Melbourne banned the use of hire e-scooters in the cities CBD.

The Role of Education in Road Safety

Why Education Matters

Education equips road users with the skills and knowledge to navigate safely. Behavioral interventions, especially for children and culturally diverse communities, play a critical role in preventing incidents.

Effective Educational Initiatives

Children's Programs: Initiatives such as RoadSet and Kidsafe Australia education programs teach basic road safety rules like crossing at marked zones and wearing reflective clothing.

Cyclist Campaigns: Programs encouraging helmet use and promoting shared road spaces have reduced cyclist fatalities by 8% in urban settings.

Older Adults Workshops: Workshops targeting older drivers and pedestrians improve awareness of age-related challenges and strategies to mitigate risks.

Gaps in Current Programs

Lack of materials tailored for Australia’s multicultural communities.

Limited use of digital tools to reach younger audiences effectively.

Infrastructure and Policy: Supporting Vulnerable Users

Infrastructure improvements and stringent policies are essential to ensure safety for VRUs.

Proven Measures

Urban Enhancements: Installing pedestrian crossings, bike lanes, and reducing speed limits in densely populated areas.

Rural Safety Measures: Improving roadside lighting and creating dedicated pathways for cyclists and pedestrians.

Policy Interventions

Helmet Laws: Universal helmet mandates have reduced head injuries by 35% (Transport and Road Safety Research Centre, 2023).

Speed Control: Enforcing speed limits in school zones and pedestrian-heavy areas can significantly lower accident rates.

Emerging Challenges and Future Directions

Adapting to New Technologies

Autonomous vehicles promise enhanced safety but require sophisticated pedestrian detection systems.

E-scooters and other micromobility options need clear regulations.

Post-Pandemic Shifts

With cycling and walking becoming more prevalent, sustaining these behaviors safely will require enhanced infrastructure and targeted campaigns.

Recommendations

- Educational Enhancements:
  - Develop gamified apps for children to learn road safety interactively.
  - Tailor safety programs for culturally diverse groups.
- Infrastructure Investments:
  - Expand separated bike lanes and pedestrian-friendly zones.
  - Prioritize rural road improvements to reduce high-speed accidents.
- Policy and Enforcement:
  - Strengthen helmet laws and promote reflective gear use among cyclists.
  - Implement stricter regulations for micromobility devices.
- Community Engagement:
  - Partner with local organizations to amplify safety messages.
  - Encourage grassroots participation in designing safer roads.

Conclusion and Call to Action

Road safety for vulnerable users in Australia demands urgent and sustained attention. By leveraging education as a preventative tool and anchoring programs in robust data, Australia can reduce road trauma and create safer environments for all.

Policymakers, educators, and communities must act collectively to prioritize the safety of society's most at-risk road users. Together, these efforts can ensure a safer future for everyone on Australia's roads.

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Report Author:

Russell White
Managing Director
Driver Safety Australia
Founder and Chair, Australian Road Safety Foundation
Road Safety Expert

Publication Type:

Research and Data Analysis: A Focus on Vulnerable Road Users and Education

Report prepared for:

Australian Road Safety Foundation

Information and data collated as at:

December 2024

Further information please contact:

Australian Road Safety Foundation