

MPC-556

December 11, 2017

Project Title:

Forging a Path to Vision Zero in the US: A Critical Analysis of Road Safety in Australia

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University of Colorado Denver

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Research Needs:

Road crashes take the lives of more than 1.2M people worldwide each year and purge more productive years of life than any other disease, including cancer and heart disease combined. Road safety engineers look to the safest motorized countries in the world – such as the Netherlands – but often make the argument that culturally, their approaches would never work in countries such as the US. While many of the Dutch approaches to transportation may work well in the US, we rarely get the chance to find out. This research project focuses on critically analyzing the transportation system of a country that is much safer than the US but also more similar in terms of transportation, land use, and culture than most European countries. Australia – with 5.3 road fatalities per 100,000 population as compared to the US rate of 12.4 – stands out as an ideal candidate.

In 1970, Australia's road fatality rate greatly exceeded that of the US, as shown in Figure 1. By 1980, the two countries were dead even. Since then, Australia has seen remarkable safety gains, far exceeding those of the US. While population-based road safety metrics are often considered a good means of measuring the public health impact of road safety, they do not account for differences in the level of motorization between these two countries. Figure 2 assesses road fatalities per 10,000 registered vehicles since 1990, and akin to what we see with the population-based exposure metric, the US currently seems to be more than twice as dangerous as Australia on a per vehicle basis. Given the most recent data, the US kills 1.33 people for every 10,000 vehicles while Australia kills approximately 0.47 people for every 10,000 vehicles. Australia's vehicle-based road fatality rate would have saved over 22,728 lives in 2015 alone and over 246,000 since 2000.

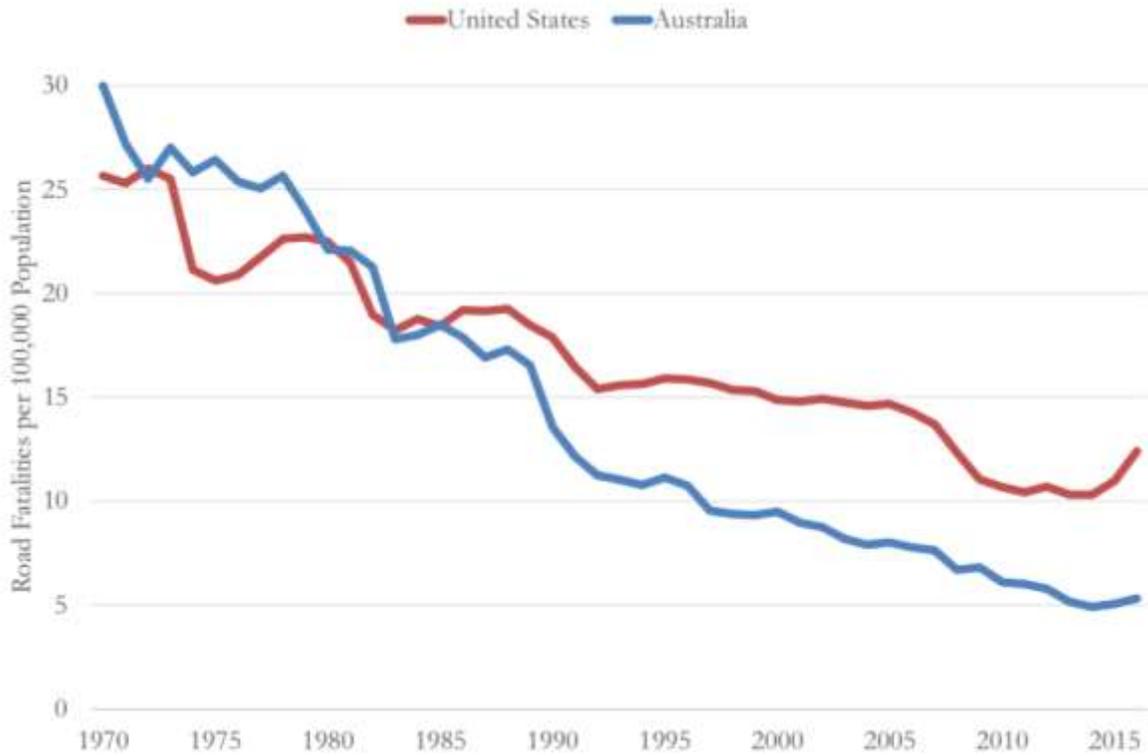


Figure 1 - Road Fatalities per 100,000 Population: US vs. Australia (1970-2016)

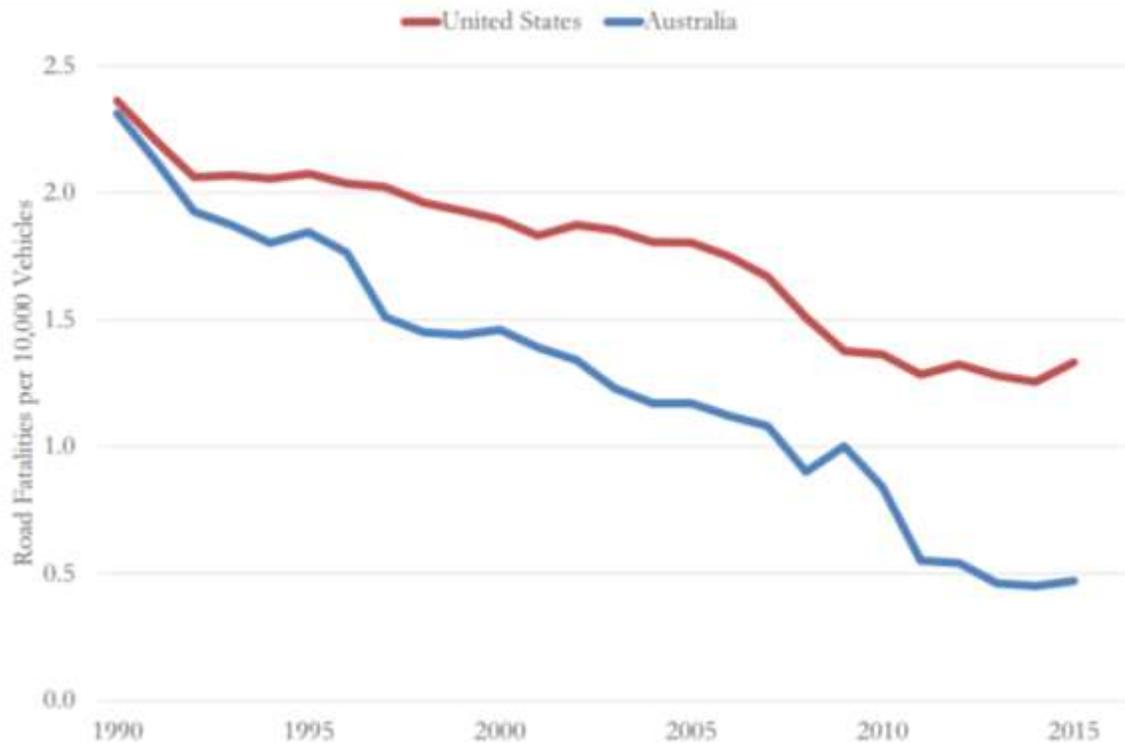


Figure 2 - Road Fatalities per 10,000 Vehicles (1990 – 2015)

After controlling for the number of vehicles, it makes sense to ask how much are these vehicles being driven. In other words, Australians may be driving much less than their American counterparts, which may in turn be reducing their overall risk and the number of road fatalities. The Australian data for driving distances was a bit more limited, so Figure 3 depicts the number of road fatalities per 100 million miles driven since 2000. Here, we see Australia as the slightly more dangerous country in the year 2000, followed by Australia gradually becoming increasingly safer than the US. The most recent data see 1.27 road fatalities in the US every 100 million miles driven as compared to 0.83 road fatalities every 100 million miles driven in Australia. This difference is not quite on the order of the population-based and vehicle-based rates but is still quite significant. For instance, if the US had the same mileage-based road fatality rate as Australia, we would expect 13,805 fewer fatalities in 2016 and over 97,000 since 2000.

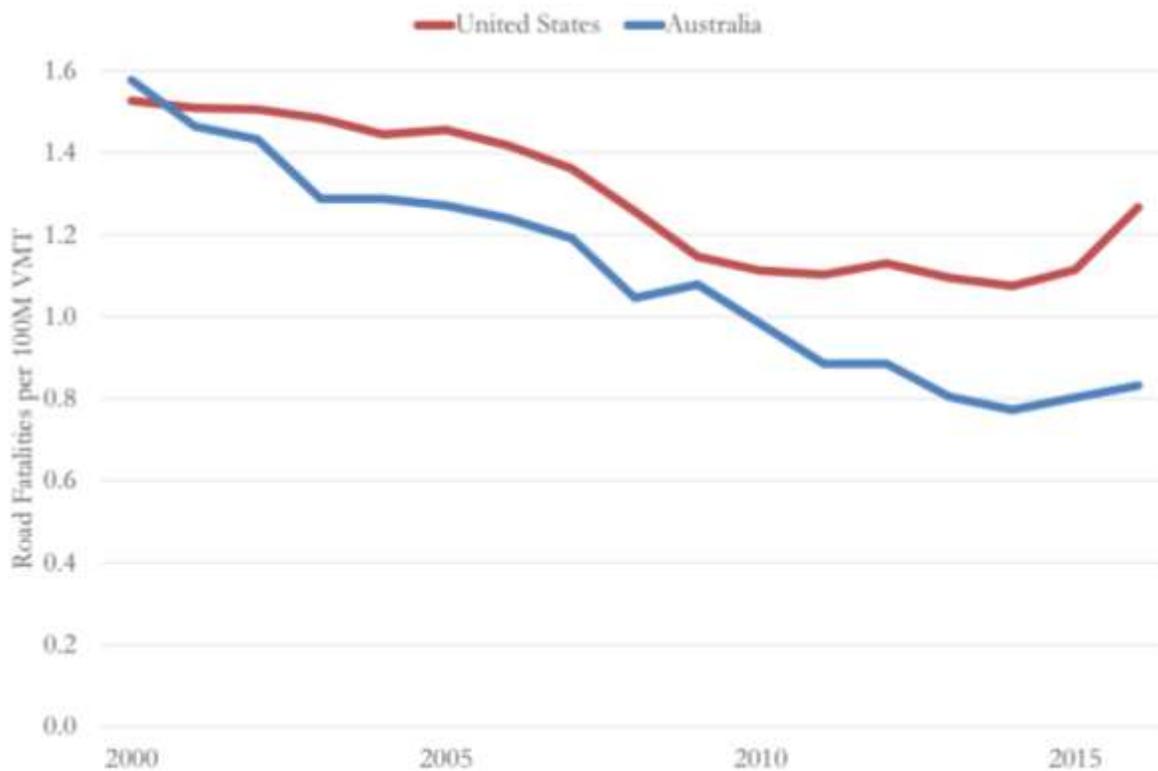


Figure 3 - Road Fatalities per 100 Million Vehicle Miles Traveled (2000 - 2016)

Whatever the underlying exposure metric used, the consistent trend is that the transportation system in Australia is safer than in the United States. The question is: why? This research project seeks to figure out what those lessons are. Having adopted their version of Vision Zero in 2003, and cut their road fatality rates significantly since then, there seems to be much the US can learn from Australia.

Research Objectives:

1. Develop a list of potential design-related reasons for Australia's better road safety outcomes

2. Develop a list of potential policy-related reasons for Australia's better road safety outcomes
3. Collect relevant socio-demographic and socioeconomic data, land use data, built environment data, and traffic exposure data
4. Research major policy efforts by these two countries as they relate to road safety
5. Characterize the influence of these factors on road safety outcomes

This research seeks to test plausible hypotheses for the country-level differences in road safety outcomes to see if they hold true. For instance, are there differences in vehicle standards or occupant protection between the US and Australia? Do we design our streets and intersections differently? How does travel behavior – and in turn exposure – differ for Americans versus Australians? Are there differences in obtaining a driver's license, enforcement efforts, or drunk driving policies or rates? Are there more overarching differences in terms of policy or built environments that might play a role?

At the conclusion of the project, we will have a better understanding of the similarities and differences in road safety outcomes between these two countries and be able to point to key policy or design differences as beneficial to Australia's road safety outcomes, or inversely, detrimental to those in the US. Beyond enhancing knowledge with respect to the aforementioned research questions, this project will also advance policy and practice with respect to improving road safety, progress the education and training of students, and build an evidence base by disseminating findings via presentations and publications.

Research Methods:

Depending upon the hypothesis under investigation, the research methods will primarily include literature reviews, historical exploration, expert interviews, and secondary data collection. For example, Australia seems more prone to using roundabouts at intersections as compared to conventional traffic controls (i.e. 1 per 65 intersections in Australia versus 1 per 1,118 intersections in the US). While roundabouts are generally deemed safer than conventional intersections in the academic literature, understanding their potential role in the national road safety differences requires a deeper look into design guidelines as well as secondary crash data.

Another potential factor behind the safety differences between these countries may relate to how the conceptualization of design speed differs with regard to street design. US guidelines suggest selecting a "design speed" that is higher than the envisioned speed limit on a street. The thinking is that drivers, inevitably, err, but when they do, the higher design speed selection essentially functions as a factor of safety. In contrast, Australian guidelines suggest setting a design speed to match the intended operating speed. The question is whether this has a road safety impact and in what ways do these differences present themselves in terms of road safety outcomes.

Beyond intersection and street design, other possible contributing factors include differences in the availability and/or penchant for safer modes of transportation such as transit, technology such as red light cameras, prevalence of scofflaw travel behaviors, as well as with land uses and the built environment. For example, while both countries are similar in terms of their overall sparse development patterns, major Australian cities tend to be somewhat denser and have higher levels of employment than their American counterparts, which have influence exposure rates and usage

of safer forms of transportation such as transit. Such issues will be critically assessed, both qualitatively and quantitatively, for their role in the road safety disparities between these two countries.

Expected Outcomes:

Australia represents a country that far exceeds US road safety outcomes and a context where potential road safety interventions could hold more sway than those found in the European countries that most of the enlightened US transportation experts currently focus on. Transferring successful designs and policies from other countries to the US context requires a greater understanding of our safer peer countries. By aggregating and scrutinizing the results for each of the above hypotheses, we expect to be able to determine the key factors that are playing into the stark differences in road safety outcomes. The expected outcomes of this work also include:

1. Findings with respect to the hypotheses and research questions
2. Manuscripts for presentation/publication at TRB and other peer-reviewed journals
3. Presentations to academic and policy audiences
4. A module about international road safety for a graduate-level transportation course at the University of Colorado Denver

Relevance to Strategic Goals:

- Safety
- Livable Communities

Safety is a critical FAST Act priority, and despite all of our advances in safety technology, the US continues to rank near the bottom of all OECD developed countries in terms of road fatality rates. Vastly improving our road safety outcomes – anywhere close to the level that the FHWA Towards Zero Deaths (TZD) vision embraces – will require system-level changes. Moreover, US DOT initiatives such as “Safer People, Safer Streets” give additional credence to the need for increasing our understanding of the complex road safety issues that road users face. Looking beyond our borders at the approaches and paradigms that are leading to better road safety outcomes in more culturally similar counties than we typically consider may lead to the sort of reassessment of our incremental approach that is needed, and in turn, help save thousands of lives.

Educational Benefits:

Students involved in this project will gain experience in road safety methods, comparative analysis, and policy investigations. This work will also be integrated into Dr. Marshall’s “Transportation System Safety” graduate course as a module on international road safety comparisons.

Tech Transfer:

The project will initially be shared through academic presentations and papers. However, the outcomes of this project should be of great interest to a wider audience that includes planners, policymakers, and the more general public. Accordingly, we will write shorter, more accessible articles for popular press outlets and/or blogs.

Work Plan:

1. Conduct historical research and literature review
2. Develop hypotheses based upon findings of step 1
3. Collect data
4. Analyze data
5. Incorporate lessons into transportation classes
6. Draft manuscripts and presentation materials

The proposed scope of work is scheduled for a one-year timeframe that will begin with a look into the historical paths that these two countries have taken when it comes to road safety during the first two months. In months 3 and 4, we will combine the findings of our historical investigation with our literature review to develop testable hypotheses for the road safety outcomes differences. Months 5 through 7 will focus on collecting the data needed to test the hypotheses, which will be followed by data analysis in months 8 and 9. Finally, we will draft manuscripts and presentation materials in months 10 through 12. Over the course of the project, we will also incorporate these lessons into a teaching module for use in a graduate-level transportation system safety course.

Project Cost:

Total Project Costs: \$80,000
MPC Funds Requested: \$40,000
Matching Funds: \$40,000
Source of Matching Funds: University of Colorado Denver

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