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Progress towards zero, an international comparison: Improvements in traffic fatality from 1990 to 2010 for different age groups in the USA and 15 of its peers

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ABSTRACT

Introduction: In January 2015, the United States Department of Transportation (USDOT) announced that the official target of the federal government transportation safety policy was zero deaths. Having a better understanding of traffic fatality trends of various age cohorts—and to what extent the US is lagging other countries—is a crucial first step to identifying policies that may help the USDOT achieve its goal. *Method:* In this paper we analyze fatality rates for different age cohorts in developed countries to better understand how road traffic fatality patterns vary across countries by age cohort. Using benchmarking analysis and comparative index analysis based on panel data modelling and data for selected years between 1990 and 2010, we compare changes in the rate of road traffic fatality over time, as well as the absolute level of road traffic fatality for six age groups in the US, with 15 other developed countries. *Results-Conclusions:* Our findings illustrate tremendous variations in road fatality rates (both in terms of the absolute values and the rates of improvement over time) among different age cohorts in all of the 16 countries. Looking specifically at the US, our analysis shows that safety improvements for Youngsters (15-17 years old) was much better than for other age groups, and closely tracked peer countries. In sharp contrast, Children (0-14 years old) and Seniors (+65 years old) in the US, fare very poorly when compared to peer countries. For example, in 2010, Children in the US were a stunning five times more likely to experience a road traffic fatality than Children in the UK. *Practical Applications:* This startling statistic suggests an immediate need to explore further the causes and potential solutions to these disparities. This is especially important if countries, including the US, are to achieve the ambitious goals set out in Zero Vision initiatives.

1. Introduction

Claiming over one million lives a year around the world, road traffic fatality is a major global public health concern (WHO, 2013). For this reason, several international institutions including the Organization for Economic Cooperation and Development (OECD), the World Bank, and the World Health Organization (WHO) closely track road fatality trends in individual countries. Over the last four decades, road fatalities in almost all developed countries have decreased. This decrease is attributable to many factors including improvements in vehicle technology, emergency response technologies and medical treatment; and more stringent enforcement of road safety regulations (Ahangari, Outlaw, Atkinson-Palombo, & Garrick, 2014; Hakim, Shefer, Hakkert, & Hocherman, 1991; Noland, 2003; Page, 2001). However, considerable variation exists in both the rate of improvement and the absolute values of road traffic fatality across different countries, even for those with similar levels of development.

The US, in particular, has underperformed most of its peers. Fig. 1 shows that the average annual improvement in road traffic fatality in the US over the last four decades was just over 2%. This rate of improvement is less than half of that achieved by the best performing countries—Germany and the Netherlands— both of whom improved at annual rates of just over 4.5%. Prior research into the underperformance in the US has examined the potential role of latent factors such as safety culture, infrastructure conditions and safety polices on changes in road fatality levels (Ahangari, Atkinson-Palombo, & Garrick, 2015). However, very little research has examined trends in traffic safety by age cohort, even though the existence of public policies directed towards different age groups suggests that the various age groups should have different rates of improvement.

In this paper we analyze the fatality rate for different age cohorts in developed countries to better understand how road traffic fatality patterns vary across countries by age cohort. One very specific question

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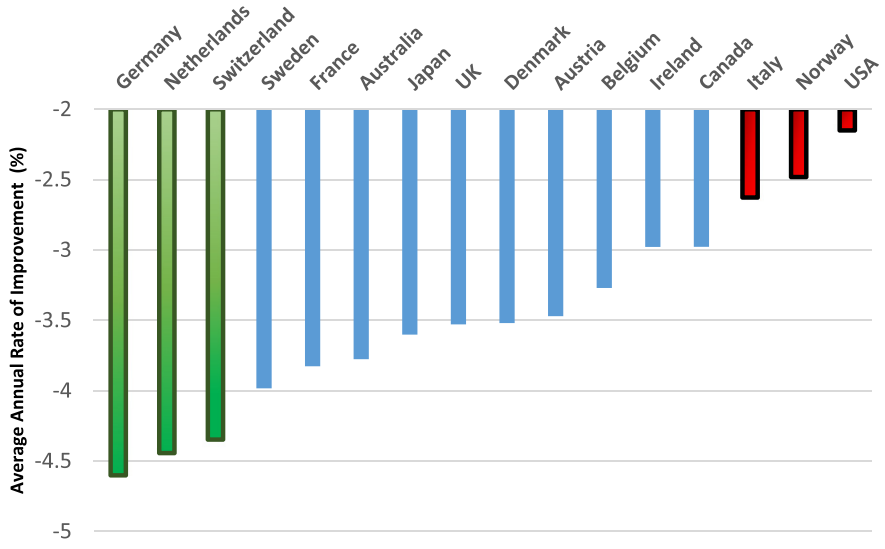

Fig. 1. Average annual improvement in traffic fatality (1970–2010).

that we seek to answer is how the US is doing relative to its peers for the various age cohorts. Using data for selected years between 1990 and 2010 (1990, 1995, 2000, 2004, and 2010), we compare changes in the rate of traffic fatality over time, as well as the absolute level of traffic fatality for six age groups in the US and 15 other developed countries (Australia, Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Japan, Norway, Sweden, Switzerland, and the UK). We used the OECD's terminology for age grouping, which is as follows: Children: Age 0–14, Youngster: Age 15–17, Late teens: Age 18–20, Young adult: Age 21–24, Adult: Age 25–64, and Senior: Age + 65.

To better understand how fatality patterns vary across countries and by age cohort, we have identified the best-performing country for each age cohort. This analysis will help policy-makers identify which countries and for what age groups significant improvements have been achieved in traffic safety. Subsequent research will be needed to pinpoint exactly which policies were responsible for the improvements, which may then help other countries emulate the success of the best performing countries.

In January 2015, following the lead of New York City and San Francisco, AASHTO and the USDOT announced that zero deaths was the official policy of the US federal government transportation safety system (USDOT, 2015). This policy envisions zero deaths as the ultimate road safety goal. Having a better understanding of the traffic fatality trends of the various age cohorts—and to what extent the US is lagging other countries—is a crucial first step to identifying policies that may lead to more rapid improvements in road safety. Given that the zero deaths policy was inspired by Sweden's Zero Death Vision program, announced in 1997, looking at initiatives in other developed countries would seem to be a natural starting point for innovative policies (Johansson, 2009). Furthermore, the findings of the benchmarking analysis for different age groups may help policymakers to develop a more effective road map toward a zero death goal by examining strategies and policies in the best performing countries for each age group.

The paper is laid out as follows. Section 2 contains a review of pertinent literature that establishes that there is very little existing research on road traffic fatality trends by age cohort at an international scale. Section 3 articulates a conceptual framework that we have created based on the literature to theorize how and why different age cohorts may experience variation in road traffic fatality. Section 4 contains the empirical analysis that explains the two major approaches that we took to analyzing the data. First, we created benchmarks using raw data for 1990 compared to 2010. This allowed us to identify the best-performing country in each age cohort at the beginning and end of our study period. In order to verify the statistical significance and robustness of these findings, we then created an index to compare the performance of each country over time using panel data modeling techniques. The results of these two complementary individual analyses were combined to quantify variations in the fatality rate for different age cohorts in developed countries, and changes in fatality rate over time. The final section of the paper contains a discussion of our results and the conclusions.

2. Literature review

A comprehensive analysis of existing research reveals a lack of research on road safety for different age groups at an international scale. Instead, existing research follows two distinct themes: (1) road safety outcomes by age cohort within individual countries; and (2) studies that have examined the traffic safety improvements for the population as a whole across different countries. To date, no research has brought together these two strands of literature. In the subsequent subsections, we summarize these two strands of literature.

2.1. The effect of age composition on traffic fatality

One of the first studies of traffic safety that illustrated the need to examine different age groups was conducted by Sivak (1983). Using data for the 50 states as well as the District of Columbia, Sivak (1983) found that the risk of road fatality in areas with a higher percentage of young drivers was higher than in other jurisdictions. This pattern was not seen for other age groups including older drivers. In 1987, Loeb investigated the determinants of road fatality across states and found that states with a higher percentage of adult and senior drivers had lower traffic fatality rates. Both studies suggested that the presence of young drivers plays an important role in road safety but stopped short of articulating a theoretical relationship between age and road fatality.

After highlighting the importance of younger age groups in road safety analysis, and in response to the lack of theoretical frameworks, a second stream of age-related research emerged. This body of work, strongly rooted in behavioral psychology, focused on the conceptual connections between young drivers' behavior and road safety. The aim of these studies was to isolate factors exclusive to road safety for youths (Deery, 2000; Gregersen & Bjurulf, 1996; Juarez, Schlundt, Goldzweig, & Stinson, 2006). For example, Deery (2000) stated that road fatality rates for young people were higher because they underestimated risk and overestimated their own skills. Consequently, numerous studies focused on the effect of policies such as the Graduated Driver Licensing (GDL), which restricts the conditions under which new drivers can