

Mobility and Mortality During the COVID-19 Pandemic



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INTRODUCTION

Social distancing and other behavioral interventions help limit the spread of infectious diseases.¹ These measures include school closures, cancellations of large gatherings, and travel restrictions.¹ We assessed the effectiveness of social distancing during the coronavirus (COVID-19) pandemic by examining the association between reductions in driving distances and mortality rates on an international basis.

METHODS

We identified the 45 countries with the highest numbers of COVID-19 cases globally, and excluded 9 countries because driving distance data were unavailable (e.g., China). We used an index date of the 100th COVID-19 case for each country to assess reductions in driving because this benchmark has been commonly used for pandemic growth. We calculated the mean change in driving from baseline for each country in the week following the index date using Apple Mobility Trends.² For each nation, we also obtained the COVID-19 mortality rate as of April 30, 2020, using the Johns Hopkins University Coronavirus Resource Center.³ We used the Spearman rank correlation coefficient to test the association between the reduction in driving distance and the COVID-19 mortality rate in each country.

RESULTS

We observed significant variation in driving across the different countries. For example, Chile had a 64% decrease whereas

Spain had a 21% increase in driving distance. We also observed substantial variation in the COVID-19 mortality rate across different countries. Belgium had the highest mortality rate (656.7 per million) and India had the lowest (0.8 per million) at the follow-up time. As predicted (Fig. 1), we observed a significant association between decreased driving and lower COVID-19 mortality ($r = 0.41$, $p < 0.001$). In an analysis restricted to countries with a population over 30 million, we observed a similar association ($r = 0.42$, $p = 0.01$). In a further sensitivity analysis restricted to 19 of the nations in our primary analysis deemed by the World Health Organization to be in the top 30 with the best public health systems, we observed consistent findings ($r = 0.38$, $p = 0.02$).⁴ In addition, we also observed a similar association between decreased walking and lower COVID-19 mortality ($r = 0.43$, $p < 0.001$).

DISCUSSION

We found that countries exhibiting early and substantial decreases in driving during the pandemic experienced less COVID-19 mortality. This connection between mobility and mortality is unlikely to be causal and, instead, may be a marker for greater overall public health diligence and individual conscientiousness. One limitation to our analysis is that countries may offer fallible reporting on COVID mortality rates. In addition, many unmeasured interventions can reduce mortality during the pandemic including case surveillance, contact tracing, adequate personal protective equipment, and the regularity of hand hygiene.^{5, 6} Regardless of mechanisms, most countries have adopted extensive social distancing procedures to quell the spread of COVID-19. Our data suggest the importance of implementing these measures early before there are thousands of observed cases.

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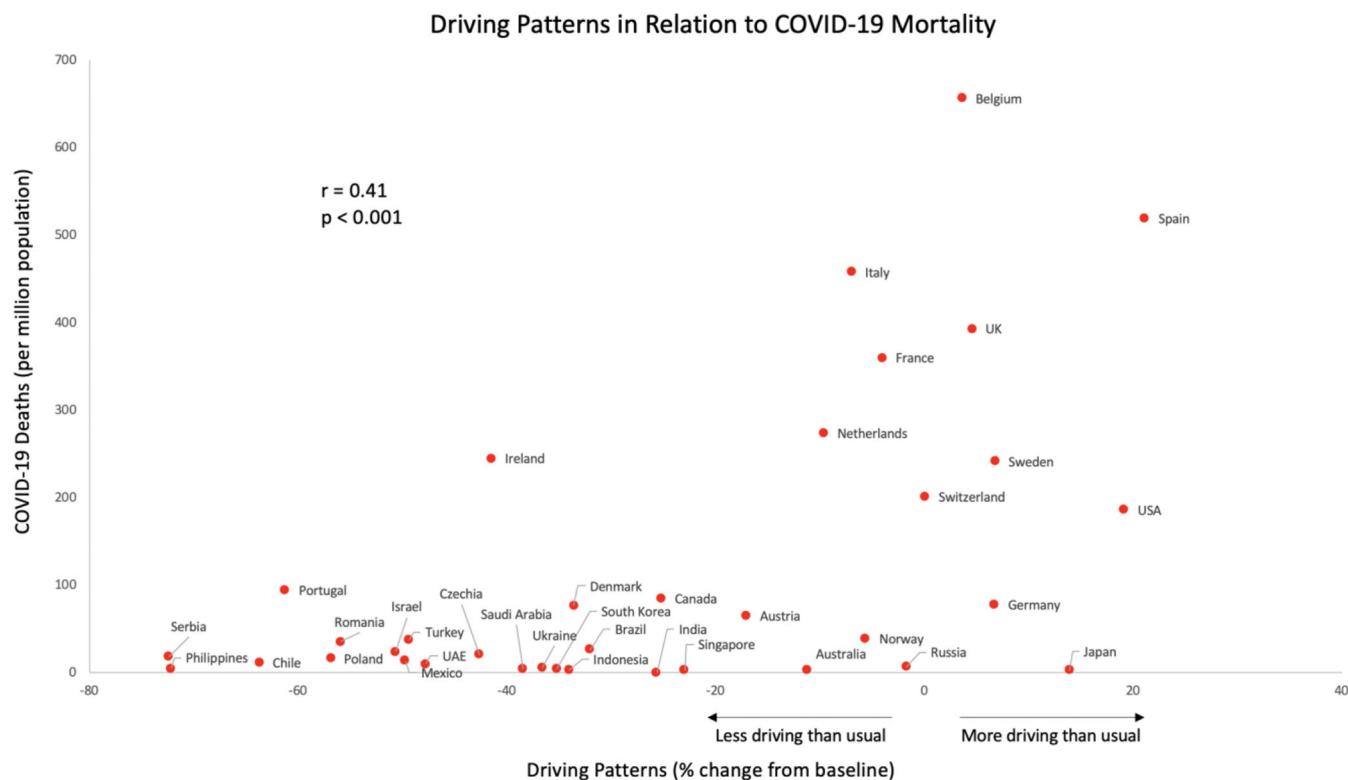


Figure 1 Association between driving patterns and COVID-19 mortality in the 36 countries with the highest number of COVID-19 cases. Countries to the right of zero exhibited increased driving, and countries to the left exhibited decreased driving. Countries low on the vertical axis experienced a relatively small mortality rate, and countries high on the vertical axis experienced a relatively large mortality rate. Overall data show a significant positive association between reduced driving and decreased mortality.

Jonathan S. Zipursky, MD, FRCPC¹
Donald A. Redelmeier, MD, FRCPC, MSHSR,
FACP^{1,2,3,4,5}

¹Department of Medicine, University of Toronto,
Toronto, Canada

²Evaluative Clinical Sciences Program, Sunnybrook
Research Institute,
Toronto, Canada

³Institute for Clinical Evaluative Sciences,
Toronto, Canada

⁴Division of General Internal Medicine, Sunnybrook
Health Sciences Centre,
Toronto, Ontario, Canada

⁵Center for Leading Injury Prevention Practice
Education & Research,
Toronto, Canada

Corresponding Author: Donald A. Redelmeier, MD, FRCPC, MSHSR,
FACP; Division of General Internal Medicine, Sunnybrook Health
Sciences Centre, Toronto, Ontario, Canada (e-mail: dar@ices.on.ca).

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Conflict of Interest: The authors declare that they do not have a
conflict of interest.

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