The United States experiences lower life expectancy at birth than many other high-income countries. Although research has focused on mortality of the population older than 50 years, much of this life expectancy gap reflects mortality at younger ages,\(^1\) when mortality is dominated by injury deaths, and many decades of expected life are lost. This study estimated the contribution of 3 causes of injury death to the gap in life expectancy at birth between the United States and 12 comparable countries in 2012. We focused on motor vehicle traffic (MVT) crashes, firearm-related injuries, and drug poisonings, the 3 largest causes of US injury death responsible for more than 100,000 deaths per year.\(^2\)

**Methods**

Using data from the US National Vital Statistics System\(^2\) and the World Health Organization Mortality Database,\(^3\) we calculated death rates by age, sex, and cause for the United States and 12 high-income countries that had similar levels of development and quality of vital registration: Austria, Denmark, Finland, Germany, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom. We used death rates to calculate life expectancy at birth for the United States and the comparison countries. We calculated the difference in life expectancy using death rates observed and after removing deaths from the 3 causes of injury.\(^1\) *The International Classification of Diseases, Tenth Revision*, codes were used to capture the 3 injury causes, which included intentional and unintentional deaths and drug poisonings from illicit and nonillicit drugs. We used Stata (StataCorp), version 13.1, for all analyses.

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**Author Contributions:** Dr Fenelon had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

*Study concept and design:* Fenelon, Chen.

*Acquisition, analysis, or interpretation of data:* All authors.

*Drafting of the manuscript:* Fenelon.

*Critical revision of the manuscript for important intellectual content:* All authors.

*Statistical analysis:* Fenelon, Chen.

*Administrative, technical, or material support:* Fenelon.

*Study supervision:* Fenelon.

**Conflict of Interest Disclosures:** All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

**Disclaimer:** The views expressed in this article are those of the authors and do not necessarily reflect the official position of the US Centers for Disease Control and Prevention.
Results

In 2012, the all-cause, age-adjusted death rate per 100000 population was 865.1 among US men vs 772.0 among men in the comparison countries (Table 1), and 624.7 among US women and 494.3 among women in the comparison countries. Men in the comparison countries had a life expectancy advantage of 2.2 years over US men (78.6 years vs 76.4 years), as did women (83.4 years vs 81.2 years). The injury causes of death accounted for 48% (1.02 years) of the life expectancy gap among men. Firearm-related injuries accounted for 21% of the gap, drug poisonings 14%, and MVT crashes 13%. Among women, these causes accounted for 19% (0.42 years) of the gap, with 4% from firearm-related injuries, 9% from drug poisonings, and 6% from MVT crashes. The 3 injury causes accounted for 6% of deaths among US men and 3% among US women.

The US death rates from injuries exceeded those in each comparison country (Table 2). Among men, these injuries accounted for more than 50% of the life expectancy gap with Austria, Denmark, Finland, Germany, and Portugal. Among women, they accounted for more than 30% of the gap with Denmark, the Netherlands, and the United Kingdom. The country-specific comparisons depend partly on the actual size of the gap in life expectancy between the United States and each country. For example, men in Portugal have lower injury mortality than US men, but a small life expectancy advantage, which results in the 3 injury causes accounting for more than 100% of the gap.

Discussion

We found systematic variation in injury deaths across countries, with relatively high rates in the United States. Although injury prevention represents an important means to improve life expectancy, the existence of predictable international patterns of injury mortality may suggest that these causes of death reflect broad factors that go beyond individual policies.\(^1\) Drug poisonings are the largest cause of US injury death,\(^4\) which may reflect higher use of prescription opioids,\(^5\) but the fundamental reasons for high US injury mortality remain unclear.

Our data are unable to completely address potential differences in cause of death coding across national death registration systems. Also, our estimated contributions assume that mortality from other causes will remain stable after the removal of injury deaths, which may not be the case. Finally, the country-specific comparisons do not reflect mortality from causes of death other than the 3 injuries. Although the reasons for the gap in life expectancy at birth between the United States and comparable countries are complex, a substantial portion of this gap reflects just 3 causes of injury.

Acknowledgments

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**Additional Contributions:** We thank the National Center for Health Statistics for institutional support and to Robert Anderson, PhD (National Center for Health Statistics), Holly Hedegaard, MD, MSPH (National Center for Health Statistics), and John Wilmoth, PhD (University of California, Berkeley), for helpful comments on an earlier version of the manuscript, none of whom received compensation.

**References**


### Table 1


<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>United States</th>
<th>Comparison Countries</th>
<th>Contribution to Life Expectancy Gap, y (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Death Rate&lt;sup&gt;b&lt;/sup&gt;</td>
<td>No. of Deaths</td>
<td>Death Rate&lt;sup&gt;b&lt;/sup&gt;</td>
<td>No. of Deaths</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major injury causes, total</td>
<td>50.2</td>
<td>78 521</td>
<td>9.3</td>
<td>21 575</td>
</tr>
<tr>
<td>Drug poisonings</td>
<td>16.1</td>
<td>25 110</td>
<td>2.7</td>
<td>5943</td>
</tr>
<tr>
<td>Firearm-related injuries</td>
<td>18.4</td>
<td>28 836</td>
<td>1.1</td>
<td>2734</td>
</tr>
<tr>
<td>MVT crashes</td>
<td>15.7</td>
<td>24 575</td>
<td>5.6</td>
<td>12 898</td>
</tr>
<tr>
<td>Other causes</td>
<td>814.9</td>
<td>1 195 101</td>
<td>762.7</td>
<td>2 100 772</td>
</tr>
<tr>
<td>All causes</td>
<td>865.1</td>
<td>1 273 622</td>
<td>772.0</td>
<td>2 122 347</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major injury causes, total</td>
<td>19.3</td>
<td>31 469</td>
<td>3.4</td>
<td>8977</td>
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<tr>
<td>Drug poisonings</td>
<td>10.1</td>
<td>16 390</td>
<td>1.6</td>
<td>3958</td>
</tr>
<tr>
<td>Firearm-related injuries</td>
<td>2.9</td>
<td>4724</td>
<td>0.1</td>
<td>191</td>
</tr>
<tr>
<td>MVT crashes</td>
<td>6.3</td>
<td>10 355</td>
<td>1.7</td>
<td>4828</td>
</tr>
<tr>
<td>Other causes</td>
<td>605.4</td>
<td>1 238 041</td>
<td>490.9</td>
<td>2 145 412</td>
</tr>
<tr>
<td>All causes</td>
<td>624.7</td>
<td>1 269 510</td>
<td>494.3</td>
<td>2 154 389</td>
</tr>
</tbody>
</table>

Abbreviation: MVT, motor vehicle traffic.

<sup>a</sup> Comparison countries: Austria, Denmark, Finland, Germany, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom.

<sup>b</sup> Death rates were age-adjusted to the 2000 US standard population and are presented per 100,000 population.

<sup>c</sup> Contribution to life expectancy gap refers to the number of years of the gap accounted for by each cause of death, with the percent contribution relative to the gap for all causes.
Table 2

Estimated Contribution of 3 Major Injury Causes to the Life Expectancy Gap by Country, 2012

<table>
<thead>
<tr>
<th>Country</th>
<th>Death Rate&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Major Injury Causes&lt;sup&gt;b&lt;/sup&gt;</th>
<th>All Other Causes</th>
<th>Life Expectancy Gap, y</th>
<th>Contribution to Life Expectancy Gap, y (%)&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>826.7</td>
<td>11.4</td>
<td>815.3</td>
<td>1.7</td>
<td>1.1 (65)</td>
</tr>
<tr>
<td>Denmark</td>
<td>862.9</td>
<td>12.9</td>
<td>850.0</td>
<td>1.5</td>
<td>1.0 (68)</td>
</tr>
<tr>
<td>Finland</td>
<td>861.5</td>
<td>21.6</td>
<td>840.0</td>
<td>0.9</td>
<td>0.8 (90)</td>
</tr>
<tr>
<td>Germany</td>
<td>814.4</td>
<td>9.0</td>
<td>805.4</td>
<td>1.8</td>
<td>1.1 (61)</td>
</tr>
<tr>
<td>Italy</td>
<td>769.8</td>
<td>12.2</td>
<td>757.6</td>
<td>2.9</td>
<td>1.0 (35)</td>
</tr>
<tr>
<td>Japan</td>
<td>716.0</td>
<td>5.6</td>
<td>710.3</td>
<td>3.5</td>
<td>1.2 (35)</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>806.5</td>
<td>8.9</td>
<td>797.5</td>
<td>2.5</td>
<td>1.1 (42)</td>
</tr>
<tr>
<td>Norway</td>
<td>788.2</td>
<td>16.2</td>
<td>772.0</td>
<td>2.7</td>
<td>0.9 (33)</td>
</tr>
<tr>
<td>Portugal&lt;sup&gt;d&lt;/sup&gt;</td>
<td>871.6</td>
<td>11.1</td>
<td>860.5</td>
<td>0.5</td>
<td>1.1 (219)</td>
</tr>
<tr>
<td>Spain</td>
<td>773.1</td>
<td>8.9</td>
<td>764.2</td>
<td>2.6</td>
<td>1.1 (45)</td>
</tr>
<tr>
<td>Sweden</td>
<td>770.8</td>
<td>16.5</td>
<td>754.3</td>
<td>3.1</td>
<td>0.9 (29)</td>
</tr>
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<td>United Kingdom</td>
<td>795.7</td>
<td>11.2</td>
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<tr>
<td>United States</td>
<td>865.1</td>
<td>50.2</td>
<td>814.9</td>
<td>Reference</td>
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<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Austria</td>
<td>553.6</td>
<td>3.1</td>
<td>550.5</td>
<td>1.9</td>
<td>0.5 (25)</td>
</tr>
<tr>
<td>Denmark</td>
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<td>5.1</td>
<td>617.9</td>
<td>0.6</td>
<td>0.4 (71)</td>
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<tr>
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<td>534.9</td>
<td>2.0</td>
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<td>Germany</td>
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<td>563.7</td>
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<td>Italy</td>
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<td>498.9</td>
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<tr>
<td>Japan</td>
<td>395.7</td>
<td>2.7</td>
<td>393.0</td>
<td>5.6</td>
<td>0.5 (9)</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>578.5</td>
<td>3.6</td>
<td>574.9</td>
<td>1.4</td>
<td>0.5 (34)</td>
</tr>
<tr>
<td>Norway</td>
<td>563.3</td>
<td>6.7</td>
<td>556.6</td>
<td>1.8</td>
<td>0.4 (21)</td>
</tr>
<tr>
<td>Portugal</td>
<td>556.8</td>
<td>2.3</td>
<td>554.5</td>
<td>1.9</td>
<td>0.5 (26)</td>
</tr>
<tr>
<td>Spain</td>
<td>469.0</td>
<td>2.6</td>
<td>466.3</td>
<td>3.8</td>
<td>0.5 (13)</td>
</tr>
<tr>
<td>Country</td>
<td>Death Rate&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Major Injury Causes&lt;sup&gt;b&lt;/sup&gt;</td>
<td>All Other Causes</td>
<td>Life Expectancy Gap, y</td>
<td>Contribution to Life Expectancy Gap, y (%)&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
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<tr>
<td>Sweden</td>
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<td>6.8</td>
<td>552.1</td>
<td>1.9</td>
<td>0.4 (19)</td>
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<tr>
<td>United Kingdom</td>
<td>590.3</td>
<td>4.5</td>
<td>585.8</td>
<td>1.1</td>
<td>0.4 (40)</td>
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<tr>
<td>United States</td>
<td>624.7</td>
<td>19.3</td>
<td>605.4</td>
<td>Reference</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Death rates were age-adjusted to the 2000 US standard population and are presented per 100,000 population.

<sup>b</sup>Drug poisonings, firearm-related injuries, and motor vehicle traffic crashes.

<sup>c</sup>Refers to the reduction in the size of the life expectancy gap with the United States after the removal of mortality from the 3 injury causes. Percent contribution relative to the gap for all causes shown in parentheses.

<sup>d</sup>The all-cause, age-adjusted death rate is higher among men in Portugal than among US men, although Portugal still has a life expectancy advantage of 0.5 years. This is because life expectancy weights mortality at younger ages more heavily than the age-adjusted, for which Portugal has a significant advantage over the United States.