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Major Causes of Injury Death and the Life Expectancy Gap Between the United States and Other High-Income Countries

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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 100000 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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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.
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Study supervision: Fenelon.

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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.

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Table 1

Estimated Contribution of 3 Major Causes of Injury Death to the Gap in Life Expectancy at Birth, 2012

Cause of Death	United States		Comparison Countries[a]		Contribution to Life Expectancy Gap, y (%)[c]
	Death Rate[b]	No. of Deaths	Death Rate[b]	No. of Deaths	
Men					
Major injury causes, total	50.2	78 521	9.3	21 575	1.02 (48)
Drug poisonings	16.1	25 110	2.7	5943	0.30 (14)
Firearm-related injuries	18.4	28 836	1.1	2734	0.45 (21)
MVT crashes	15.7	24 575	5.6	12 898	0.28 (13)
Other causes	814.9	1 195 101	762.7	2 100 772	1.13 (52)
All causes	865.1	1 273 622	772.0	2 122 347	2.15 (100)
Women					
Major injury causes, total	19.3	31 469	3.4	8977	0.42 (19)
Drug poisonings	10.1	16 390	1.6	3958	0.20 (9)
Firearm-related injuries	2.9	4724	0.1	191	0.08 (4)
MVT crashes	6.3	10 355	1.7	4828	0.14 (6)
Other causes	605.4	1 238 041	490.9	2 145 412	1.82 (81)
All causes	624.7	1 269 510	494.3	2 154 389	2.23 (100)

Abbreviation: MVT, motor vehicle traffic.

[a] Comparison countries: Austria, Denmark, Finland, Germany, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom.

[b] Death rates were age-adjusted to the 2000 US standard population and are presented per 100 000 population.

[c] 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

Country	Death Rate[a]			Life Expectancy Gap, y	Contribution to Life Expectancy Gap, y (%)[c]
	All Causes	Major Injury Causes[b]	All Other Causes		
Men					
Austria	826.7	11.4	815.3	1.7	1.1 (65)
Denmark	862.9	12.9	850.0	1.5	1.0 (68)
Finland	861.5	21.6	840.0	0.9	0.8 (90)
Germany	814.4	9.0	805.4	1.8	1.1 (61)
Italy	769.8	12.2	757.6	2.9	1.0 (35)
Japan	716.0	5.6	710.3	3.5	1.2 (35)
The Netherlands	806.5	8.9	797.5	2.5	1.1 (42)
Norway	788.2	16.2	772.0	2.7	0.9 (33)
Portugal[d]	871.6	11.1	860.5	0.5	1.1 (219)
Spain	773.1	8.9	764.2	2.6	1.1 (45)
Sweden	770.8	16.5	754.3	3.1	0.9 (29)
United Kingdom	795.7	11.2	784.5	2.2	1.0 (47)
United States	865.1	50.2	814.9	Reference	
Women					
Austria	553.6	3.1	550.5	1.9	0.5 (25)
Denmark	623.0	5.1	617.9	0.6	0.4 (71)
Finland	543.3	8.4	534.9	2.0	0.3 (15)
Germany	567.2	3.5	563.7	1.7	0.5 (28)
Italy	501.6	2.7	498.9	3.0	0.5 (16)
Japan	395.7	2.7	393.0	5.6	0.5 (9)
The Netherlands	578.5	3.6	574.9	1.4	0.5 (34)
Norway	563.3	6.7	556.6	1.8	0.4 (21)
Portugal	556.8	2.3	554.5	1.9	0.5 (26)
Spain	469.0	2.6	466.3	3.8	0.5 (13)

Country	Death Rate[a]			Life Expectancy Gap, y	Contribution to Life Expectancy Gap, y (%)[c]
	All Causes	Major Injury Causes[b]	All Other Causes		
Sweden	558.9	6.8	552.1	1.9	0.4 (19)
United Kingdom	590.3	4.5	585.8	1.1	0.4 (40)
United States	624.7	19.3	605.4	Reference	

[a] Death rates were age-adjusted to the 2000 US standard population and are presented per 100 000 population.

[b] Drug poisonings, firearm-related injuries, and motor vehicle traffic crashes.

[c] 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.

[d] 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.