

**Anomalously warm temperatures are associated with increased injury deaths:**

**Extended Data**

Robbie M Parks<sup>1,2</sup>, James E Bennett<sup>1,2</sup>, Helen Tamura-Wicks<sup>1,2</sup>, Vasilis Kontis<sup>1,2</sup>, Ralf Toumi<sup>3</sup>,  
Goodarz Danaei<sup>4</sup>, Majid Ezzati<sup>1,2,5\*</sup>

<sup>1</sup>MRC-PHE Centre for Environment and Health, Imperial College London, London, United Kingdom

<sup>2</sup>Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, London, United Kingdom

<sup>3</sup>Space and Atmospheric Physics, Imperial College London, London, United Kingdom

<sup>4</sup>Harvard T.H. Chan School of Public Health, Boston, Massachusetts, USA

<sup>5</sup>WHO Collaborating Centre on NCD Surveillance and Epidemiology, Imperial College London, London, United Kingdom

\* Correspondence to: [majid.ezzati@imperial.ac.uk](mailto:majid.ezzati@imperial.ac.uk)

16    **Extended Data Figure 1.** Graphic representation of temperature anomaly measure used in the  
17    analysis. The graph shows how monthly temperatures in July two example states (Florida in  
18    red and Minnesota in blue) (left panel) for 1980-2017 are used to calculate temperature  
19    anomalies. As seen, a warmer state like Florida (top right) can have a smaller inter-annual  
20    variation in a particular month (here, July) compared with a cooler state like Minnesota (bottom  
21    right).

22    **Extended Data Figure 2.** Average size of temperature anomaly ( $^{\circ}\text{C}$ ) from 1980 to 2017, by  
23    state and month. The value for each state and month is the mean of the absolute size of anomaly,  
24    be it cold or warm, and hence gives an indication of the scale of anomalies around the local  
25    average temperatures.

26    **Extended Data Figure 3.** Additional annual injury deaths for the 2017 US population in year  
27    in which each month was +2°C warmer compared with 1980-2017 average temperatures. The  
28    top row shows breakdown by type of injury, sex and age group. The bottom row shows the  
29    break down by type of injury, sex and month. Black dots represent net changes in deaths for  
30    each set of bars.

31    **Extended Data Figure 4.** Percent change in death rates in year in which each month was  
32    +2°C compared with 1980-2017 average temperatures by type of injury, sex and (A) age  
33    group or (B) month.

34     **Extended Data Figure 5.** Number of deaths by type of transport injury, month, sex and age  
35     group in the contiguous United States for 1980-2017.

36 **Extended Data Table 1.** Injury groups used in the analysis with ICD-9 and ICD-10 codes.

| Injury type  |                                       | ICD-9                              | ICD-10           |
|--|---------------------------------------|------------------------------------|------------------|
| Unintentional  | Transport                             | E800-E849                          | V01-V99          |
|  | Falls                                 | E880-E888                          | W00-W19          |
|  | Drownings                             | E910                               | W65-W74          |
|  | Other unintentional<br>(not analysed) | E850-E869, E890-E909,<br>E911-E928 | W20-W64, W75-X59 |
| Intentional  | Suicide                               | E950-E959                          | X60-X84          |
|  | Assault                               | E960-E969                          | X85-Y09          |
| Intention undetermined<br>(not analysed)                     |                                       | E980-E989                          | Y10-Y34          |
| Legal intervention and operations of war<br>(not analysed)   |                                       | E970-E979, E990-E999               | Y35-Y36          |
| Complications of medical and surgical care<br>(not analysed) |                                       | E870-E879, E930-E949               | Y40-Y84          |
| Sequelae of external causes<br>(not analysed)                |                                       | E929                               | Y85-Y89          |

37 **Extended Data Table 2.** Number of deaths and population over the study period (1980-  
38 2017) for injuries included in the analysis.

| Sex    | Age group (years) | Transport | Falls   | Drowning | Suicide | Assault | Population (millions) |
|--------|-------------------|-----------|---------|----------|---------|---------|-----------------------|
| Male   | 0-4               | 19,263    | 1,828   | 14,110   | 0       | 14,137  | 379.6                 |
|        | 5-14              | 42,669    | 1,324   | 11,158   | 7,748   | 8,974   | 759.5                 |
|        | 15-24             | 316,862   | 8,801   | 26,335   | 147,423 | 180,145 | 801.9                 |
|        | 25-24             | 243,115   | 12,592  | 18,433   | 183,075 | 168,401 | 806.3                 |
|        | 35-34             | 175,783   | 17,389  | 13,617   | 175,251 | 98,664  | 748.8                 |
|        | 45-44             | 144,482   | 26,760  | 10,941   | 162,956 | 56,557  | 646.6                 |
|        | 55-54             | 110,084   | 36,343  | 8,420    | 126,006 | 29,811  | 508.0                 |
|        | 65-74             | 78,582    | 51,674  | 6,027    | 91,763  | 14,365  | 342.9                 |
|        | 75-84             | 62,262    | 95,526  | 4,136    | 70,682  | 6,531   | 176.4                 |
|        | 85+               | 23,756    | 103,976 | 1,596    | 25,633  | 1,861   | 49.9                  |
| Female | 0-4               | 15,366    | 1,040   | 7,499    | 0       | 11,357  | 362.7                 |
|        | 5-14              | 25,912    | 489     | 3,517    | 2,971   | 5,894   | 725.1                 |
|        | 15-24             | 114,825   | 1,372   | 2,773    | 29,346  | 33,585  | 768.3                 |
|        | 25-24             | 75,607    | 2,096   | 2,756    | 43,114  | 39,843  | 797.5                 |
|        | 35-34             | 64,139    | 3,996   | 2,757    | 53,786  | 29,759  | 759.6                 |
|        | 45-44             | 55,040    | 8,301   | 2,737    | 56,141  | 17,900  | 672.5                 |
|        | 55-54             | 47,243    | 15,337  | 2,443    | 40,004  | 10,302  | 555.5                 |
|        | 65-74             | 47,478    | 34,426  | 2,213    | 22,261  | 7,572   | 417.0                 |
|        | 75-84             | 46,699    | 96,857  | 2,270    | 12,705  | 6,086   | 266.9                 |
|        | 85+               | 18,243    | 176,591 | 1,171    | 4,573   | 2,620   | 112.0                 |

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**Extended Data Table 3.** Correlation coefficients between monthly anomalies generated from daily mean temperature and daily maximum and minimum temperatures. Each correlation coefficient was calculated in each state for each month for 1980-2017, then averaged over all states for each month.

| <b>Month</b> | <b>Mean daily temperature<br/>and<br/>maximum daily temperature</b> | <b>Mean daily temperature<br/>and<br/>minimum daily temperature</b> |
|--------------|---|---|
| January      | 0.98  | 0.98  |
| February     | 0.98  | 0.98  |
| March        | 0.97  | 0.97  |
| April        | 0.97  | 0.96  |
| May          | 0.96  | 0.94  |
| June         | 0.95  | 0.92  |
| July         | 0.97  | 0.94  |
| August       | 0.96  | 0.93  |
| September    | 0.93  | 0.91  |
| October      | 0.91  | 0.93  |
| November     | 0.96  | 0.97  |
| December     | 0.97  | 0.98  |

**Extended Data Table 4.** Correlation coefficients between anomaly of mean daily temperature and measures of extreme anomalous temperature described in Methods. Each correlation coefficient was calculated in each state for each month for 1980-2017, then averaged over all states for each month.

| Temperature variables   | Anomaly of mean (main analysis) | Anomaly of 90 <sup>th</sup> percentile | Number of days above long-term 90 <sup>th</sup> percentile | Number of 3+ day episodes above long-term 90 <sup>th</sup> percentile |
|---|---------------------------------|--|--|---|
| Anomaly of mean (main analysis)                                       |                                 | 0.79                                   | 0.75   | 0.6   |
| Anomaly of 90 <sup>th</sup> percentile                                | 0.79                            |  | 0.89   | 0.77  |
| Number of days above long-term 90 <sup>th</sup> percentile            | 0.75                            | 0.89                                   |  | 0.86  |
| Number of 3+ day episodes above long-term 90 <sup>th</sup> percentile | 0.6                             | 0.77                                   | 0.86   |   |