Projecting Future Temperature-Driven Changes in Crime

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Background on Crime-Climate Relationship

Background literature has demonstrated a positive relationship between temperature and crime rates. The nuances of the relationship vary depending on the crime type but most results show a clear linear trend.

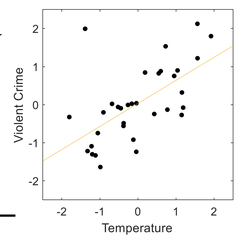
The Routine Activities Theory is the most likely mechanism. Pleasant weather leads to increased interpersonal encounters and greater victim availability. Given natural climate seasonality, the Routine Activities Theory is a stronger driver in the winter months when weather is harsher.

Determining Crime Sensitivity to Temperature

Crime data and climate data were gathered from the Federal Bureau of Investigation's (FBI) Uniform Crime Reporting database (UCR) and NOAA's North American Regional Reanalysis (NARR) and span from 1979-2016.

Agency data were combined across five internally consistent US regions (see Harp and Karnauskas, 2018).

The sensitivity of crime to temperature can be calculated by taking the slope of the linear relationship for each region-month. This calculation was bootstrapped 10,000 times to characterize the uncertainty.

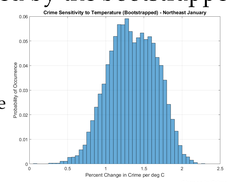


Climate Model Projections

Surface air temperature were taken from the historical (47 models; 1850-2005), RCP4.5 (30 models; 2006-2100), and RCP8.5 (42 models; 2006-2100) experiments of the CMIP5.

Output from mid-century and end-of-century time periods, along with projections for different levels of **global** warming (1.5, 2, 3, and 4 degrees Celsius), were multiplied by the bootstrapped sensitivities.

Sensitivity of crime to temperature



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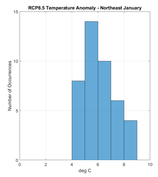

Climate model temp. projections

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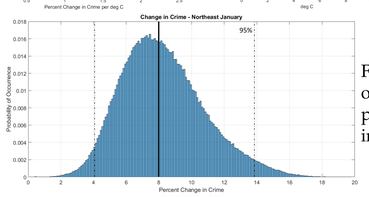

Full distribution of probability of projected change in crime

It is possible to quantify a relationship between crime and temperature and project that relationship into the future using climate model output.

Estimated **additional violent crimes** by the end of the century attributable to temperature range in the **upper hundreds of thousands to several million for the US** (using 2014 crime baselines).

For More Information

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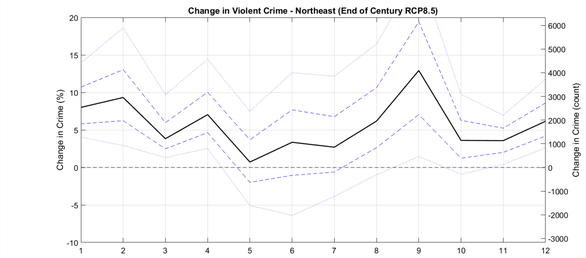
Scan QR Code to view foundational publication:

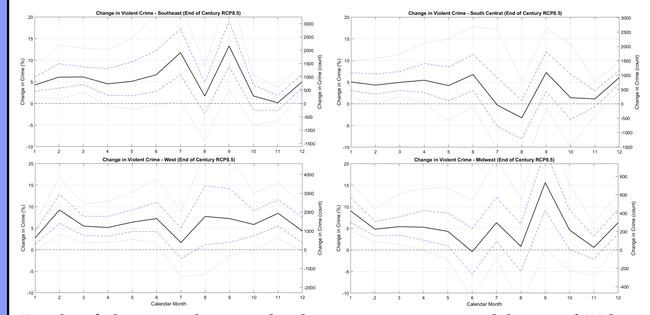
Harp, R. D., & Karnauskas, K. B. (2018). The Influence of Interannual Climate Variability on Regional Violent Crime Rates in the United States. GeoHealth, 2(11), 356-369.

Acknowledgments

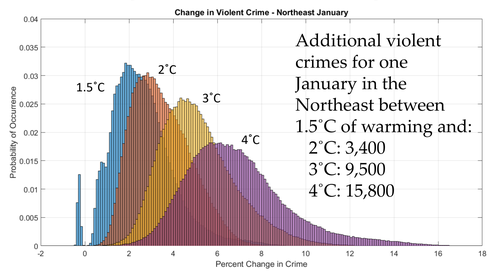
The author thanks the FBI and NOAA for use of the UCR and NARR data sets, respectively. In addition, the author acknowledges the World Climate Research Program's Working Group on Coupled Modeling and affiliated climate modeling groups for distribution of their model output.

Projections of the Change in Crime Across Calendar Months and Regions





Back of the envelope calculations estimate additional US crimes attributable to temperature at **1.4 million violent (740,000 property) crimes for the RCP4.5 scenario and 2.4 million violent (1.2 million property) crimes for the RCP8.5 scenario** by the end-of-the-century.



Additional violent crimes for one January in the Northeast between 1.5°C of warming and:

2°C: 3,400

3°C: 9,500

4°C: 15,800

Things to Consider

Climate is just one input into the overall crime rate. **This is not a prediction of how much crime will occur!**

The sensitivity of crime to temperature may change over time if people's behaviors adapt to a warmer climate.

Applying a relationship derived from interannual variability to future climate projections is common practice but imperfect.