

Violent crime rates rise in warmer winters

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As global temperatures climb, warmer winters in parts of the country may set the scene for higher rates of violent crimes such as assault and robbery, according to a new CIRES study. Credit: Tony Webster/Wikimedia Commons

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"During mild winters, more people are out and about, creating the key ingredient for interpersonal crimes: opportunity," said Ryan Harp, a CIRES/CU Boulder Ph.D. student and lead author of the study published today in the AGU's cross-disciplinary journal, *GeoHealth*.

In an innovative new assessment, Harp and his advisor, CIRES Fellow Kris Karnauskas, used powerful [climate](#) analysis techniques to investigate the relationship between year-to-year fluctuations in climate and violent [crime rates](#) in U.S. cities since 1979. Their methods accounted for the fact that [crime](#) rates have dropped significantly since the 1990s in most places. These long-term trends, driven by many societal factors, create the "baseline" for the new analysis.

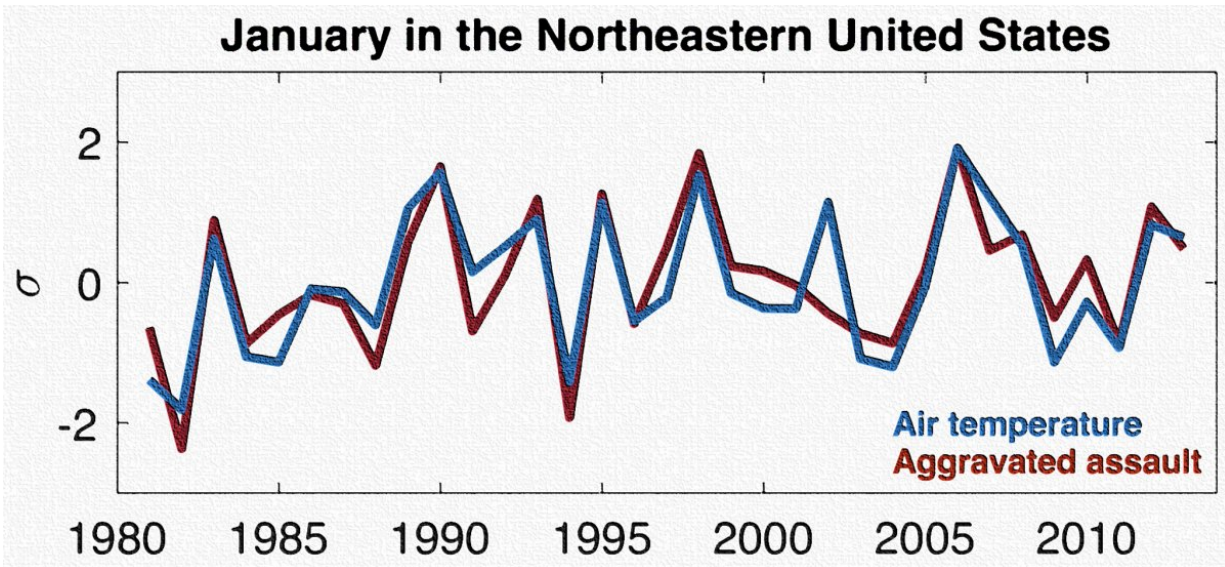
"Consequently, we considered the crime rate differences from that baseline," said Karnauskas, who is also an Associate Professor of Atmospheric and Oceanic Sciences at the University of Colorado Boulder.

He and Harp obtained monthly violent and property crime data for over 16,000 cities directly from the FBI, specifically the Uniform Crime Reporting (UCR) Program. The database, which was snail-mailed to Karnauskas' lab after only a few phone calls and extraction from tape drives at a FBI data center in West Virginia, included all types of [violent crimes](#) including murder, rape, robbery, aggravated assault, burglary, larceny, and motor vehicle theft. The scientists relied on historical climate data from NOAA's North American Regional Reanalysis (NARR).

They divvied data up by broad climate regions in the United States, and then measured the strength of the relationship between climate variables and crime in each region.

Combining these data sets revealed a strong relationship between crime and temperature, in particular, including a much stronger correlation in

winter than in summer months. For example, in winter in the northeastern United States, the relationship was so tight that temperature changes alone could explain more than half of the year-to-year ups and downs in crime rates. In the summer, the relationship between temperature and crime patterns diminished.



The relationship between temperature and crime in winter. Credit: University of Colorado at Boulder

The strength of the wintertime correlation was surprising, Harp said, given that crime rates vary for all kinds of reasons.

"It's highly unusual to find correlations this high in big, messy data sets, especially spanning disciplines like climate and health or sociology. The initial disbelief forced us to recheck our work more than a couple of times," Karnauskas added.

Part of the power in the new research approach, he and Harp said, was "zooming out" from a city-by-city approach to look at all cities within a climate region. When researchers study only a single city, a local change in, for example, policing or demographics might have made it harder to pick out the impact of temperatures on crime. By aggregating thousands of cities into a region that simultaneously experiences similar year-to-year fluctuations, the connection between temperature and crime became obvious.

The new assessment also provides insight into why climate anomalies affect crime rates, including some of the strongest evidence to date in support of one theory about how crime patterns may be linked with weather and climate: The Routine Activities Theory. That theory states that despite the complexity of human behavior and external forces, interpersonal crime is driven by a relatively simple combination of ingredients: a motivated offender, a suitable target, and the absence of a guardian who could prevent a violation. So pleasant weather may increase the chances of all three factors converging; lousy weather may decrease it.

In addition to Routine Activities is the Temperature-Aggression Hypothesis, which suggests that people act more aggressively in extreme heat. Because Harp and Karnauskas found that the relationship between temperature and crime rates loosened during summer, Routine Activities Theory likely explains what we're seeing, Harp said. During mild winters, more people are out and about more often than during colder times, creating the opportunity for interaction.

These findings imply that in some regions of the United States, warming temperatures due to [anthropogenic climate change](#) could exacerbate crime rates, especially in winter, Harp said. He and his colleagues are now dissecting data and building models with an eye to predicting future crime rates, as well as how crime might be affected by the world's

changing climate.

"This study is significant because it broadens our thinking on connections between climate and human health, to encompass a very real and dangerous threat to our bodily safety and, therefore, health," said Karnauskas.

More information: Ryan D. Harp et al, The Influence of Interannual Climate Variability on Regional Violent Crime Rates in the United States, *GeoHealth* (2018). [DOI: 10.1029/2018GH000152](https://doi.org/10.1029/2018GH000152)

Provided by University of Colorado at Boulder

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