The Washington Post

Wonkblog

There's a surprisingly strong link between climate change and violence

By Chris Mooney October 22 at 2:19 PM

Milwaukee Brewers' Carlos Gomez, left, avoids a high inside pitch caught by Cincinnati Reds catcher Devin Mesoraco, right, in the seventh inning of a baseball game Sept. 24. There could be a little realized connection to the weather. (AP Photo/Al Behrman)

Earlier this year, when a study came out suggesting global warming will increase the rates of violent crimes in the United States -- producing "an additional 22,000 murders, 180,000 cases of rape," and many other crime

increases by the year 2099 -- it drew widespread criticism. "This ... is what people who are losing the argument look like," noted the conservative publication *National Review*.

One study may seem easy to dismiss. But the combined results of 56 of them? Not so much.

In a new working paper released by the National Bureau of Economic Research, Stanford researcher Marshall Burke and two colleagues present a meta-analysis -- an evaluation and statistical synthesis of a large body of studies -- of the existing research examining the relationship between climate change and violence and conflict. After throwing out a host of studies they consider flawed, Burke and his colleagues still had 56 left, many of them quite recent.

Climate variables considered in these papers included temperature increases as well as drought and rainfall changes. Conflict was analyzed in terms of clashes between individuals (like fistfights) and fights between groups (like wars). After taking it all in, the authors found compelling evidence of a link between changes in temperature and increases in conflict, noting that "deviations from moderate temperatures and precipitation patterns systematically increase the risk of conflict, often substantially, with average effects that are highly statistically significant." Bottom line: In an ever warming world, expect more wars, civil unrest, and strife, and also more violent crime in general.

More specifically, for a degree Celsius of temperature increase (1.8 degrees Fahrenheit), Burke says there could be a 20 percent increase in civil conflict in Africa. The impact of warming varies by region, however; some places are more sensitive to small heat increases than others. In the United States, the

estimate would be lower: For 1 degree Celsius of warming, he'd expect about a 1 percent increase in interpersonal conflicts, a category that includes crimes like assault and robbery but also road rage and fights at baseball games.

It is important to emphasize the strength of this conclusion: It emerges from multiple studies, the vast majority of which point to the same takeaway conclusion. For example, across 19 studies, Burke and his colleagues found 24 separate estimates of the relationship between temperature changes and various kinds of conflict outcomes, and in every case, that relationship was positive. "The probability of getting 24 positive values if there was in fact no relationship between temperature and conflict ... is less than 1 in 100 million," Burke said in an e-mail. "It's like flipping a coin 24 times and getting heads each time."

All of this begs the question: *Why* do hotter temperatures produce more violence?

The relationship certainly sounds intuitive, and was speculated about long before it could be scientifically studied. Burke notes that in Shakespeare's *Romeo and Juliet*, Benvolio tells his friend Mercutio that they should get out of the heat, seeming to suggest that hot temperatures produce violent conflicts, which is not a good idea given the ongoing feud between Montagues and Capulets:

I pray thee, good Mercutio, let's retire:
The day is hot, the Capulets abroad,
And, if we meet, we shall not scape a brawl;
For now, these hot days, is the mad blood stirring.

Since the Bard's day, psychological research has cast more light on the matter. For instance, one of the studies cited in the new meta-analysis is a 2011 paperpublished in *Psychological Science* (discussed in more depth here) showing a relationship between hot temperature days and the number of retaliatory beanballs thrown by Major League Baseball pitchers.

The figure below shows their results in more detail:

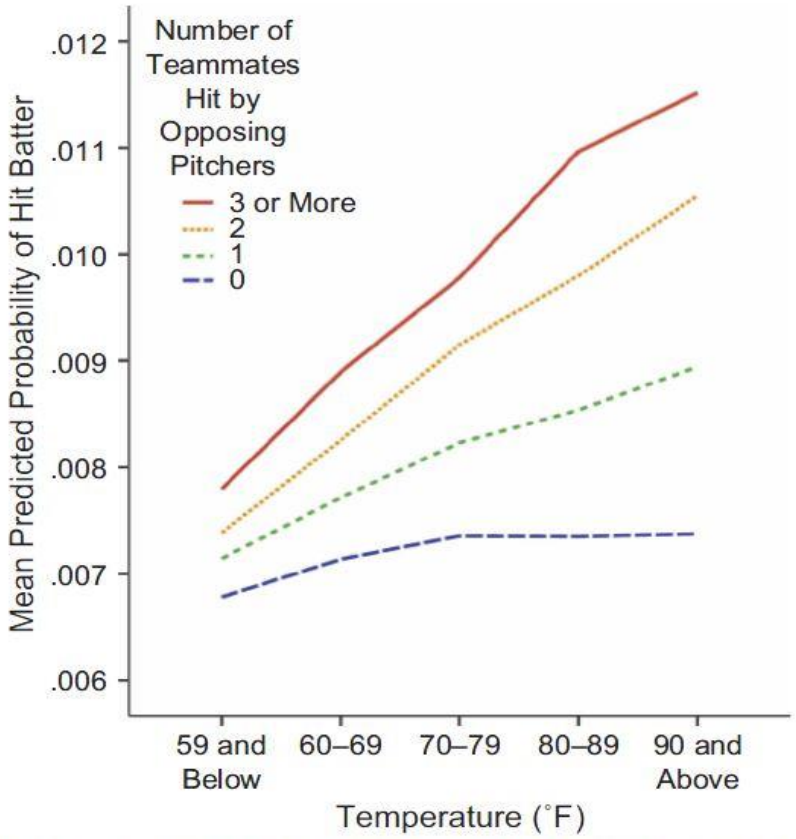

Fig. 1. Predicted probability of a batter being hit as a function of temperature and the number of the pitcher's teammates hit by the opposing team's pitcher earlier in a game.

Credit: Richard Larrick et al, 2011, Temper, temperature, and temptation: Heat-related retaliation in baseball. Psychological Science, 22, 423-428. Reprinted with permission.

The study's lead author Richard Larrick, a professor at Duke's Fuqua School of Business, explained in an e-mail the psychological research linking heat with shows of aggression.

"Researchers in social psychology have studied the relationship between temperature and aggression for many decades," Larrick said. That includes studies looking at links between a day's temperature and people engaging in real world behaviors ranging from honking horns to committing violent crimes. "Research in the laboratory," Larrick continues, "allowed for tightly controlled tests to show that changes in temperature directly lead to more aggression." Such research has shown, he notes, that "heat changes the way people feel and think, increasing anger and making thoughts of aggression increase."

It is important to underscore that the temperature-violence relationship is not deterministic. In their meta-analysis, Burke and his colleagues liken the situation to "the rise in car accident rates during rainy days" -- the rain ups the risk of accidents overall, but each accident is still contingent on the individual situation and choices (and mistakes) of the drivers involved.

Similarly, warmer temperatures seem to shift the overall background risk for violent conflict -- but whether someone commits a violent act remains dependent upon the specific circumstances and the individual.

So the relationship is statistical -- but that doesn't make it any less real. "We believe there is overwhelming evidence of a strong relationship between changes in temperature in particular, and various types of human conflicts," says Burke.