

Anger is all the rage on Twitter when it's cold outside (and on Mondays)

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Days with high angry tweet counts correlated with major news events. Credit: Shutterstock

The link between hot weather and aggressive crime is [well established](#). But can the same be said for online aggression, such as angry tweets? And is online anger a predictor of assaults?

Our study [just published](#) suggests the answer is a clear "no." We found angry tweet counts actually increased in cooler weather. And as daily maximum temperatures rose, angry tweet counts decreased.

We also found the incidence of angry tweets is highest on Mondays, and perhaps unsurprisingly, angry Twitter posts are most prevalent after big news events such as a leadership spill.

This is the first study to compare patterns of assault and social media anger with temperature. Given [anger spreads](#) through online communities faster than any other emotion, the findings have broad implications—especially under climate change.

Algorithms are watching you

Of Australia's 24.6 million people, 18 million, or 73%, [are active social media users](#). Some 4.7 million Australians, or 19%, use Twitter. This widespread social media use provides researchers with valuable opportunities to gather information.

When you publicly post, comment or even upload a selfie, an algorithm can scan it to estimate your mood (positive or negative) or your emotion (such as anger, joy, fear or surprise).

This information can be linked with the date, time of day, location or even your age and sex, to determine the "mood" of a city or country in near real time.

Our study involved 74.2 million English-language Twitter posts—or tweets—from 2015 to 2017 in New South Wales.

We analyzed them using the publicly available [We Feel](#) tool, developed by the [CSIRO](#) and the [Black Dog Institute](#), to see if social media can accurately map our emotions.

Some 2.87 million tweets (or 3.87%) contained words or phrases considered angry, such as "vicious," "hated," "irritated," "disgusted" and the very popular "f*cked."

Hot-headed when it's cold outside

On average, the number of angry tweets were highest when the temperature was below 15°, and lowest in warm temperatures (25-30°).

The number of angry tweets slightly increased again in very high temperatures (above 35°), although with fewer days in that range there was less certainty about the trend.

On the ten days with the highest daily maximum temperatures, the average angry tweet count was 2,482 per day. Of the ten coldest days, the average

angry tweet count was higher at 3,354 per day.

The pattern of angry tweets was opposite to that of physical assaults, which are more prevalent in hotter weather—with some evidence of a decline in extreme heat.

So why the opposite patterns? We propose two possible explanations.

First, hot and cold weather triggers a physiological response in humans. Temperature affects our [heart rate](#), the amount of oxygen to our brain, hormone regulation (including testosterone) and our ability to sleep. In some people, this in turn affects physical aggression levels.

Second, weather triggers changes to our routine. [Research suggests](#) aggressive crimes increase because warmer weather encourages behavior that fosters assaults. This includes more time outdoors, increased socializing and drinking alcohol.

Those same factors—time outdoors and more socializing—may reduce the opportunity or motivation to tweet. And the effects of alcohol (such as reduced mental clarity and physical precision) make composing a tweet harder, and therefore less likely.

This theory is supported by our finding that both angry tweet counts, as well as overall tweet counts, were lowest on weekends, holidays and the hottest days,

It's possible that as people vent their frustrations online, they [feel better](#) and are then less inclined to commit an assault. However, this theory [isn't well supported](#).

The relationship is more likely due to the vastly different demographics of Twitter users and assault offenders.

[Assault offenders](#) are most likely to be young men from low socio-economic backgrounds. In contrast, about half of [Twitter users](#) are female, and they're more likely to be middle-aged and in a higher income bracket compared with other social media users.

Our study did not consider why these two groups differ in response to temperature. However, we are currently researching how age, sex and other social and demographic factors influence the relationships between temperature and aggression.

The Monday blues

Our study primarily set out to see whether temperatures and angry tweet counts were related. But we also uncovered other interesting trends.

Average angry tweet counts were highest on a Monday (2,759 per day) and lowest on weekends (Saturdays, 2,373; Sundays, 2,499). This supports research that found an [online mood slump on weekdays](#).

We determined that [major news events](#) correlated with the ten days where the angry [tweet](#) count was highest. These events included:

- the federal leadership spill in 2015 when Malcolm Turnbull replaced Tony Abbott as prime minister
- a severe storm front in NSW in 2015, then a major cold front a few months later
- two mass shootings in the United States: Orlando in 2016 and Las Vegas in 2017
- sporting events including the Cricket World Cup in 2015.

Twitter in a warming world

Our study was limited in that Twitter users are not necessarily representative of the broader population. For example, Twitter is a preferred medium for [politicians](#), [academics](#) and [journalists](#). These users may express different emotions, or less emotion, in their posts than other social media users.

However, the influence of temperature on social media anger has broad implications. Of all the emotions, [anger spreads](#) through online communities the fastest. So temperature changes and corresponding social media anger can affect the wider population.

We hope our research helps health and justice

services develop more targeted measures based on [temperature](#).

And with climate change likely to affect [assault rates](#) and [mood](#), more research in this field is needed.

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