Feeling hot triggers impulsive behavior and irritability

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Heat blanketed Chicago during the summer of 2022, with hot, sticky days followed by sweltering nights.

In the nation's third-largest metro area, about 400 residents tracked their moods during a summer when temperatures hit 100° by mid-June. Were they feeling cranky? Acting impulsively? Lashing out verbally? Yes, yes, and yes, according to survey results.

When people were uncomfortably hot in their homes, they reported increases in impulsive behavior. In neighborhoods with lower-income

households and less tree canopy, residents also noticed being easily angered and verbally aggressive.

The research, posted to *PsyarXiv* preprint server was conducted by Kimberly Meidenbauer, an assistant professor in Washington State University's Department of Psychology, with colleagues at the University of Chicago. Her aim: a better understanding of how heat affects mood and mental health in real-life settings.

Heat waves' ties to antisocial behavior have spawned decades of theories. Psychologists and others have probed the correlation between hot temperatures and higher rates of domestic violence, assaults, and hospital admissions for overdoses and suicide attempts.

Despite the societal toll, much remains unknown about heat's impact on emotional well-being, Meidenbauer says. "There honestly hasn't been much research on this, and most of the work has occurred in laboratories with people performing cognitive tasks. I wanted to study this issue with a diverse and representative sample of people in a real setting with a lot of detail."

Meidenbauer and her team conducted surveys from May through September, analyzing Census tract data for insights about household income, tree canopies in neighborhoods, access to parks, and the urban heat island effect, in addition to what people self-reported. Survey respondents were scattered across the Chicago metro area.

The numbers of people experiencing heat stress in their homes and reporting impulsive behaviors was concerning, she says.

"The idea here is that if you are more impulsive, you might be more likely to engage in risky behaviors including substance abuse and self-harm. Even after the heat dissipates, the impulsiveness seems to stick

around for a while, which is kind of crazy," Meidenbauer says.

Heat appears to affect the brain's prefrontal cortex, which is important for planning, self-control, and emotional function.

"Some studies show that, with heat exposure, the prefrontal cortex's connectivity with other important brain regions gets disrupted," Meidenbauer says. "Other studies suggest that when your body is thermoregulating, it takes up resources, which could be cognitively taxing."

Heat also affects many of the psychotropic medications used to treat mental illnesses, which could be a factor in self-harm, she says. In addition, some types of aggression have been linked to impulsive behavior.

Meidenbauer says the study results underscore the need for resources to protect people's mental health during heat waves.

"Going forward, we need to focus on infrastructure that can cool things down," she says. "That includes buildings designed with passive cooling systems and urban green spaces that reduce the heat island effect."

But in the short term, access to affordable cooling systems will be critical for low-income and at-risk populations, Meidenbauer says.

"The biggest mitigating factor for heat," she says, "was whether survey respondents had access to air conditioning in their homes and whether they could afford to run it."

More information: Kimberly Lewis Meidenbauer et al, Evidence for environmental influences on impulsivity and aggression (2023). DOI: 10.31234/osf.io/epkru

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