

# Study discovers unique brain signature of intimate partner aggression

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Why do people hurt the ones they claim to love? That question has driven researchers to discover much about the psychological and

sociological predictors and consequences of intimate partner aggression. But an understanding of the neurobiological causes—or what happens in the brain—remains incomplete.

A new study led by Virginia Commonwealth University researchers used functional magnetic resonance imaging to examine the [brain](#) activity of 51 male-female romantic couples as they experienced intimate partner aggression in real time.

They found that aggression toward intimate partners was associated with aberrant activity in the brain's medial prefrontal cortex, or MPFC, which has many functions, but among them is the ability to foster perceptions of closeness with and value of other people.

"We found that aggression towards [intimate partners](#) has a unique signature in the brain," said lead author David Chester, Ph.D., an associate professor in the Department of Psychology in the College of Humanities and Sciences. "There is something distinct happening at the neural level when people decide whether to harm their romantic partners, a process that differs in a meaningful way from decisions about whether to harm friends or strangers."

The research was led by Chester's Social Psychology and Neuroscience Lab, which seeks to understand the psychological and biological processes that motivate and constrain aggressive behavior. The study, "Neural Mechanisms of Intimate Partner Aggression," will be published in the journal *Biological Psychology*.

The researchers were able to observe couples' brain activity during intimate partner aggression by asking participants to play a computer game against three people, one at a time: Their romantic partner, a close friend, and a stranger. In reality, they were playing against a computer.

The participants were tasked with pressing a button faster than their opponents. The loser, they were told, would be punished with a nasty blast of sound in their headphones. The researchers measured aggression by giving participants, and their fictitious opponents, the opportunity to select the volume of that sound blast, with higher volume representing more aggression, and lower volume representing less aggression.

"Basically, we gave participants repeated opportunities to hurt or not hurt each of these three people, and we examined how brain activity changed based on who they thought they were hurting," Chester said. "But ... no one was actually hurt by this computer game, participants unknowingly played against the computer."

The researchers' findings also extended beyond the lab into the real world. They had participants fill out a validated questionnaire that asked whether they had perpetrated acts of intimate partner violence prior to the study.

They found that blunted medial prefrontal cortex activity predicted some of the participants' real-world acts of intimate partner violence.

"We expected to see that intimate partner aggression was linked to a unique signature of [brain activity](#)," Chester said. "What we were surprised about was the ability of this brain signature to predict real-world intimate partner violence."

They also investigated how men's and women's neural activity affected each other's aggression. They found that women's intimate partner aggression was predicted by their male partner's brain response to perceived provocation.

"This result fits with the well-established finding that women's intimate partner aggression may very often be in self-defense," Chester said.

Taken together, he said, the study's results provide new insights into brain regions that are likely to be fruitful targets for interventions that aim to reduce intimate partner aggression and help science build an accurate brain model of such harmful acts.

Chester added that the researchers approached this study with utmost care. Couples were pre-screened to ensure they were not at elevated risk for intimate partner violence. The researchers carefully debriefed each participant individually to make sure they felt comfortable to be reunited with their partner. And they carefully debriefed both partners again as a couple to make sure there were no lingering, negative effects of the study.

"We had robust protocols in place in case anything went wrong, to safeguard the well-being of our participants," Chester said. "It is of paramount importance that studies into intimate partner aggression prioritize the safety and well-being of their participants, and we believe we achieved this goal."

While this study focused on male-female intimate partner [aggression](#), Chester said future work is needed to examine these dynamics across a greater diversity of gender identities and sexual orientations.

**More information:** David S. Chester et al, Neural mechanisms of intimate partner aggression, *Biological Psychology* (2021). [DOI: 10.1016/j.biopsycho.2021.108195](#)

Provided by Virginia Commonwealth University

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