

The arithmetic of gun control

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Aiming to quell heated national debate about gun control with factual answers, two UC Irvine mathematicians have designed parameters to measure how to best prevent both one-on-one killings and mass shootings in the United States. Their paper appears Friday in the journal *PLoS ONE*.

"It's time to bring a scientific framework to this problem," said lead author Dominik Wodarz, a mathematical biologist who works on disease and evolutionary dynamics. His co-author and wife, Natalia Komarova, a [mathematician](#) who studies biomedical and social trends, added: "Can we design a rational way to argue about guns?"

Both were appalled not just by the December shooting deaths of 20 youngsters and eight adults in Newtown, Conn., but also by the bitterly emotional dispute over weapons that erupted anew. They decided to put their professional expertise to work.

"This debate cannot be settled satisfactorily by verbal arguments alone, since these are often driven by opinion and lack a solid scientific backing," the authors write. "What is under debate is essentially an epidemiological problem: How do different [gun control](#) strategies affect the rate at which people become killed by attackers, and how can this rate be minimized?"

The duo reviewed available data stretching as far back as World War I, then drew up equations to compute whether policies ranging from a total firearm ban to "arm everyone" increase or decrease homicides. After

running the numbers, they found that in more common domestic and one-on-one crimes, reduced legal gun availability – if properly enforced – is likelier to lower deaths. But in rare [mass shootings](#), armed citizens might save lives if sufficiently trained to avoid accidentally shooting fleeing bystanders.

They note that data is missing that could strengthen their results. For instance, homeowners who used a weapon to stop a robbery might not make a report to police. "Stand your ground" laws being widely discussed in the wake of Trayvon Martin's killing could influence the parameters too. "Whether such laws better protect the public or increase deaths needs to be determined statistically," Wodarz said. "Do you have a greater chance of dying if you run or if you face your attacker with a weapon?"

The authors say key parts of their equations should be studied more closely: the fraction of offenders who illegally possess a gun, the statistical degree of protection provided by legal gun ownership, and the number of people who are legally carrying a gun when attacked. Comprehensive data in those areas, they say, could further aid the development and implementation of effective policies.

Federal funding for gun control research was essentially nonexistent for nearly two decades, but President Barack Obama in January labeled firearm deaths a public health crisis and ended the longstanding freeze. About 11,000 Americans die each year from gunshot [homicides](#).

A large number of peer reviews - 11 in total - were solicited by journal editors; two or three are the norm. A wide array of opinions were expressed, ranging from enthusiastically positive and constructive to a critic who stated that scientific methods would never be useful in this area.

The authors were warned to be prepared for heated responses to their paper but believe it's critical to bring the best tools of research to the issue.

"If the current discussion could be steered toward science, rather than having a heated debate without much of a logical foundation, a big step forward toward saving lives would be achieved," they said.

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