Mathematics ties media coverage of gun control to upticks in gun purchases

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For the first time, researchers have shown a causal link between print news media coverage of US gun control policy in the wake of mass shooting events and increases in firearm acquisition, particularly in states with the least restrictive gun laws. Credit: NYU Tandon: Shinnosuke Nakayama

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news media coverage of U.S. gun control policy in the wake of mass shooting events and increases in firearm acquisition, particularly in states with the least restrictive gun laws.

The results of a study led by researchers at NYU Tandon School of Engineering, in collaboration with faculty at the UCLA Fielding School of Public Health and Northeastern University, are rooted in a data-driven approach that reveals causal relationships, rather than mere correlations. It is the first study to quantify the influence of news media stories on firearm prevalence.

"Media Coverage and Firearm Acquisition in the Aftermath of a Mass Shooting" was published today in *Nature Human Behaviour*.

Increases in firearm purchases following mass shootings are well-observed phenomena, likely driven by concerns that these events could lead to more restrictive gun controls. Lead author Maurizio Porfiri, NYU Tandon professor of mechanical and aerospace engineering, noted that this is the first study to empirically examine—and confirm—the link between news stories specifically about gun policy and increased acquisition of firearms. However, in one surprising finding, the analysis revealed no causal link between an actual mass shooting and gun purchases. Previous studies had noted a correlation between the two.

The latest study quantified influences among the three variables: mass shooting events, media coverage of gun control policy and regulations, and firearm acquisition. Researchers analyzed 69 mass shootings in the United States between January 1999 and December 2017, gathering data on the number of firearm background checks per month (a proxy measure for gun purchases), along with all print news coverage of firearm control policies that appeared in The New York Times and The Washington Post during that same period—more than 9,700 documents.

The increases in firearm background checks were most pronounced in states with the least restrictive gun control policies—including Alabama, Arkansas, Florida, Idaho, Kansas, Ohio, and Oregon—and less dramatic in states with stronger restrictions on gun ownership. The team found no significant links between other variables.

"This study provides the critical insight that media coverage appears to mediate the increase in firearm acquisition following mass shootings," Porfiri said.

"The public health impact of firearm-related physical injury has dramatically increased over recent years and is now a leading cause of death," said James A. Macinko, a co-author of the study and professor of health policy and management and community health sciences at the UCLA Fielding School of Public Health. "Our study suggests the need for dialogue around how mass shooting events are discussed by the press, in order to find ways to mitigate unintended consequences."

The team employed a mathematical construct known as entropy transfer, which can establish causal links between multiple variables by examining the degree to which one variable influences another. In these analyses, influence is defined as an improved ability to make predictions about the future status of a variable (in this case, background checks) based on present knowledge of another variable (media stories about gun control policy).

To further test the validity of the causal link, researchers also searched for influential relationships between mass shootings, background checks, and media coverage of gun-related topics that excluded discussion of gun control policies or regulations. The only link discovered was obvious: a causal link between mass shootings and media coverage of those events. The team also probed potential causal links between firearm background checks and media coverage of unemployment,

which has been linked to higher rates of violent crime and could theoretically prompt heightened interest in acquiring firearms for self-defense. None was found.

"The results establish the first step toward our aim of creating a mathematical model of the firearm ecosystem in the United States that explains the relationships among key events," said co-author Rifat Sipahi, a professor of mechanical and industrial engineering at Northeastern University. "Moving forward, one key aspect of such a model will be to understand how subsequent events unfold and how the presence of time delays between them influence the fate of the ecosystem."

Co-author Shinnosuke Nakayama, a postdoctoral fellow in Porfiri's laboratory, added: "As an ecologist, I see gun violence in the U.S. as complex ecological processes consisting of multiple agents interacting with each other and the environment. By identifying keystone agents and their ecological functions through rigorous statistics, we will be able to provide tools and transparent guidance for policy."

Raghu Ram Sattanapalle, a doctoral student in Porfiri's Dynamical Systems Laboratory, is also part of the research team.

"At the heart of NYU Tandon is a desire to develop technologies and knowledge that make the world safer, healthier, and more sustainable," said NYU Tandon Dean Jelena Kovačević. "This research embodies that goal, revealing new and important insights into one of the drivers behind the growth in the number of firearms in the United States. I congratulate Professor Porfiri and his collaborators on a thought-provoking paper that stands to have significant societal impact."

The researchers acknowledge several limitations to the study, including the small number of media outlets analyzed. Additionally, background

checks are not a direct measure of gun purchases, although they are the closest proxy measure due to the lack of a nationwide gun registry. The study accounted for neither the number of people killed per mass shooting nor the circumstances under which the event took place—elements that can influence media coverage.

More information: Media coverage and firearm acquisition in the aftermath of a mass shooting, *Nature Human Behaviour* (2019). DOI: 10.1038/s41562-019-0636-0 , www.nature.com/articles/s41562-019-0636-0

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