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People light candles at a memorial to three women who were shot by a gunman at a spa in Atlanta, Georgia, in March.

GUN VIOLENCE IS SURGING — RESEARCHERS FINALLY HAVE THE MONEY TO ASK WHY

With historically high levels of new funding, US gun-violence research is starting to find its footing. **By Nidhi Subbaraman**

Maeve Wallace has studied maternal health in the United States for more than a decade, and a grim statistic haunts her. Five years ago, she published a study showing that being pregnant or recently having had a baby nearly doubles a woman's risk of being killed¹. More than half of the homicides she tracked, using data from 37 states, were perpetrated with a gun.

In March 2020, she saw something she hadn't seen before: a funding opportunity from the US National Institutes of Health (NIH) to study deaths and injuries from gun violence. She had mentioned firearms in her studies before. But knowing that the topic is politically fraught, she often tucked related terms and findings deep within her papers and proposals. This time, she says, she felt emboldened to focus on guns specifically, and to ask whether policies

that restrict firearms for people convicted of domestic violence would reduce the death rate for new and expecting mothers. Male partners are the killers in nearly half of homicides involving women in the United States. "This call for proposals really motivated me to ask the research questions that I may not have otherwise asked," says Wallace, an epidemiologist at Tulane University in New Orleans, Louisiana.

Wallace's group is one of several dozen

funded by a new pool of federal money for gun-violence research in the United States, which has more firearm-related deaths than any other wealthy nation. Although other countries fund research on guns, it is often in the context of trafficking and armed conflict. US federal funding of gun-violence research has not reflected the death toll, researchers say.

The new money comes after more than two decades of what has essentially been a freeze on funding for the topic. And that's left a massive knowledge gap, says Asheley Van Ness, director of criminal justice at Arnold Ventures in New York City, a philanthropic organization that pledged US\$20 million to gun research in 2018, in part because of the paltry federal funding. "For decades we just have under-researched basic questions on gun violence," she says.

Spurred by advocacy that followed some high-profile school shootings, Congress has now authorized \$25 million for each of the past two years to go to the NIH and the US Centers for Disease Control and Prevention (CDC) for the study of gun violence as a public-health issue. In April, President Joe Biden suggested doubling that figure.

Although researchers were initially slow to answer the funding call, studies such as Wallace's are starting to look at how gun policies affect homicide rates. Others will investigate strategies to reduce suicides, which typically account for nearly two-thirds of gun deaths in the United States. And a handful of state health departments around the country are getting funding to collect better statistics on gun-related injuries.

The opening of the tap for federal dollars is considered an important advance, but those who have been watching the field for years say it will take more money and consistent investment to attract a committed cohort of researchers and fill in the data gaps. "That's like turning a ship," says David Studdert, who studies health law at Stanford Law School in California.

Meanwhile, gun violence in the United States shows no signs of slowing: 2020 emerged as the deadliest year in two decades, and the first few months of 2021 look even worse.

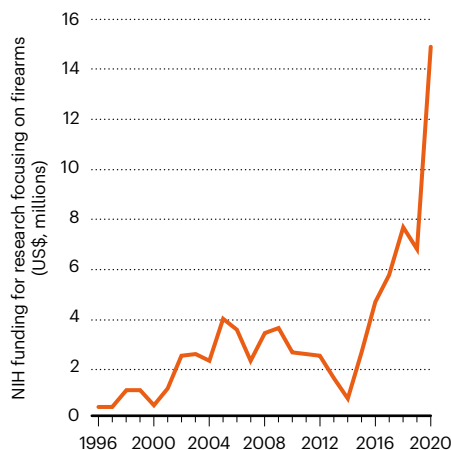
Control clause

Federal funds for firearms research have been heavily restricted ever since the 1996 Dickey Amendment, a clause added to that year's annual spending bill that barred the CDC from funding any effort that advocates or promotes gun control.

Although the amendment did not explicitly ban research on firearms, the CDC saw its budget cut by \$2.6 million in the year it passed – the same amount the agency was spending on the topic. CDC administrators saw the move as a message to steer clear, says Andrew Morral, a behavioural scientist at the Rand Corporation in Washington DC and director

GUN-RESEARCH FUNDING IN THE UNITED STATES

Funding for gun-violence research from the US National Institutes of Health remained relatively meagre until a series of shootings a decade ago prompted calls for more resources. In 2020, Congress specifically allocated funds to study the topic.



of the National Collaborative on Gun Violence Research, a consortium of foundations that fund firearms research.

The amendment remained in subsequent spending bills, and researchers who continued to work on gun violence say that their work received more scrutiny. "Any research we would put forward would create just a waterfall of backlash," says Charles Branas, an epidemiologist at Columbia University's Mailman School of Public Health in New York City. The gun lobby would argue that the work was biased, Branas says. Lawmakers would start asking questions. "That's not something a cancer researcher has to contend with," he says. "I think it scared off a lot of potential young scientists."

The result has been an anaemic level of funding for research on one of the top 20 causes of mortality in the United States. One 2017 estimate² says that gun-violence research is funded at about \$63 per life lost, making it the second-most-neglected major cause of death, after falls. Private foundations have tried to fill the gap, but the levels are still low. The longest-running private funder, the Joyce Foundation in Chicago, Illinois, has invested \$32 million since 1993; its annual funding has surpassed \$2 million only once.

Things began to change after 2012 when a gunman shot and killed 20 children and 6 staff, before killing himself, at Sandy Hook Elementary School in Newtown, Connecticut. Amid a raging political fight over gun control, then-president Barack Obama called on federal agencies to fund research on the topic, triggering a call for proposals at the NIH (but not at the CDC, where funding is more tightly controlled by congressional appropriations).

Sandy Hook set the stage for federal funding to open up, says Nina Vinik, a former programme director and now a consultant at the Joyce Foundation. Among the numerous

efforts to push for gun policy, "advocates saw that the case for federal funding for research was just an easy one for people to understand and get behind", she says.

Funding figures bear this out. According to data provided by the NIH, between 1996 and 2015 the agency spent just under \$2 million per year on average on research related to firearms. A new analysis by *Nature* estimates that the average more than tripled to just over \$6 million per year over the next four years (see 'Gun-research funding in the United States').

Then, in February 2018, a shooter in Parkland, Florida, killed 17 people at the Marjory Stoneman Douglas High School, and injured 17 others before police arrested him. A national firestorm erupted over gun-control policies alongside renewed advocacy for research funding. The next month, lawmakers added language to the annual budget legislation that clarified the conundrum posed by the Dickey Amendment, stating that "the CDC has the authority to conduct research on the causes of gun violence". Lawmakers eventually authorized dedicated funding in December 2019, giving \$12.5 million each to the CDC and the NIH specifically for gun-violence research. Congress approved a second round of funding for the 2021 fiscal year in December, and President Biden in his budget request for 2022 asked for \$50 million to go to the agencies.

Immediate impact

In March 2020, with the COVID-19 pandemic looming, the NIH put out a call for projects seeking to study public-health questions related to gun violence.

Wallace at Tulane was one of nine researchers funded through the mechanism. She says that her research on gun laws could have direct relevance to policy. Gathering evidence that rules in some states reduce deaths for pregnant people could persuade other states to enact similar measures. That would be huge, Wallace says, because it "identifies a policy that states can pass now and have an immediate impact".

Lisa Wexler, a community-based participatory researcher at the University of Michigan in Ann Arbor, also answered the NIH's funding call. She was looking for ways to involve families in her work to prevent suicides in rural Alaska. During the 1990s and 2000s, Wexler worked there as a mental-health counsellor and a community organizer, and saw the crisis faced by Alaska Native youth. Alaska's Indigenous people are twice as likely to die by suicide as are non-native residents of the state, and it is the leading cause of death for Alaska Native men under the age of 24.

She and her collaborators at the Maniilaq Association, an Alaska Native non-profit organization in Kotzebue that provides health services to Northwest Alaska residents, are laying the groundwork to test a new approach to gun



Los Angeles police ran a gun-buyback programme after an increase in shootings this year.

safety. At health clinics, they will give people a brief talk about the need to safely store firearms at home, and offer them a lockable ammunition box or the option to have someone install a gun cabinet. “Making the environment safer is incredibly important, and it’s sort of an overlooked part of what we need to be doing for suicide prevention specifically in this country,” says Wexler. Past studies have shown that limiting access to lethal means correlates with a decline in suicide rates^{3,4}. Wexler’s programme, by involving all residents, acknowledges the Alaska Native values of community support and belonging – as well as the ubiquity and necessity of gun ownership in the region.

“Hunting and fishing and gathering and living close to the land and animals and sea is still very deeply ingrained in the region here,” says Arlo Davis, Family Safety Net coordinator at the Maniilaq Association, who works with Wexler. “Our challenge is how do we do this research without shaming anybody – because most households have guns.”

Any shift in suicide trends will take some years to see, Wexler says, but she hopes such an approach will be one way to reduce the death toll.

Across the country in Philadelphia, implementation scientist Rinad Beidas at the University of Pennsylvania is testing whether routine paediatric visits can be an effective time to talk with new parents about gun safety. Like Wexler, Beidas hopes to prevent suicides – the risk of death by suicide is higher when guns are easily accessible in a home. Her NIH-funded project will have paediatricians counselling parents about ways to limit gun access – for instance, by keeping firearms unloaded and locked away in their homes – alongside the conventional checklist of child-safety measures, including car seats and smoke alarms. Study volunteers will also receive locks for their guns from the

programme. “Just like we made cars safer with seatbelts, we want to make homes safer around safe firearm storage,” she says.

All told, the NIH disbursed about \$8.5 million to nine new proposals in 2020, short of the \$12.5 million authorized by Congress. The agency attributes the shortfall to the timing with the pandemic: “We did not receive as many applications to the [Funding Opportunity Announcement] as we would have liked,” a spokesperson for the NIH told *Nature* by e-mail. The agency applied the remaining money, plus another \$1.5 million, towards 12 other projects that included firearm research as an aspect of their proposal, for a total of about \$14 million.

Branas served on review committees evaluating research applications for both the NIH and the CDC, and says that, despite the low number of applications specifically to the gun-research call, he was encouraged by the responses. “We felt like maybe there was some kind of pent-up interest in the topic, and people just didn’t have an outlet to apply.”

At the CDC, 18 research projects received just over \$8 million for multi-year studies. The CDC also spent \$2.2 million on an effort to gather data on emergency-room visits for non-fatal firearm injuries in ten states. The appropriation for this fiscal year will be used to fund the existing projects. “It was incredibly gratifying and important to receive this funding,” says James Mercy, director of the Division of Violence Prevention at the CDC’s Injury Center. “We’ve been operating for almost 25 years not being able to fully address the role of firearms in violence.”

Keeping momentum

It’s not yet clear whether the available funding levels will be sustained or expanded. One theme could be key to keeping bipartisan

support for funding, says Mark Rosenberg, who led the CDC’s Injury Center at the time it was facing heat from Congress in 1996. In his view, more projects should be studying the impact that regulations have on those who own guns legally, because policy is often stymied by the perception that safety measures serve only to restrict rights. “I don’t know yet how to measure it effectively, but until you measure it, people will be free to say that any law impinges too much on the rights of law-abiding gun owners.”

Some watchers are hopeful that the funding levels will increase, even if they don’t hit Biden’s target of \$50 million annually. “We’ve opened the door now and I don’t see it closing,” says Vinik. State governments seem to have momentum as well: lawmakers in California, New Jersey and Washington state, among others, have allocated funds for researching violence prevention and safety.

But what’s still missing, researchers say, is federal support to tackle big, expensive, basic questions. For instance, nearly 40% of US households have a gun, and most people buying one say it’s for protection. But the limited data that are available suggest that homes with guns are not safer, says Studdert. “That’s a very fundamental disconnect between the admittedly somewhat modest science we have in this area, and the perspectives of most gun buyers in the United States.”

Community organizations have for decades created and used violence-prevention techniques, but they have not been tested with field surveys. “Some of them probably work, some of them probably don’t. But we need the research to identify the ones that work and the effective ingredients in those programmes,” Morral says. “And that’s expensive.”

Morral and others think that more investment will be needed to fully address the public-health issue that guns present in the United States. An analysis commissioned by Arnold Ventures and the Joyce Foundation, published this month⁵, estimates that meeting public-health data collection and research needs on this topic will cost between \$587 million and \$639 million in federal funding over five years. That’s a big gap. “Twenty-five million is a pittance,” Branas says. “We need at least another zero at the end of that.”

Nidhi Subbaraman is a senior reporter for *Nature* in Washington DC.

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