Firearm Injury and Violence Research Articles in Health Sciences by Funding Status and Type: A Scoping Review

Sixtine Gurrey

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Public Health

University of Washington

2020

Committee:

Ali Rowhani-Rahbar

Frederick P. Rivara

Program Authorized to Offer Degree:

Epidemiology

University of Washington

Abstract

Firearm Injury and Violence Research Articles in Health Sciences by Funding Status and Type: A Scoping Review

Sixtine Gurrey

Chair of the Supervisory Committee:

Ali Rowhani-Rahbar

Department of Epidemiology

Background

Federal funding for firearm injury and violence research is a politically volatile area marked by Congressional restrictions and executive actions. Little is known about the field's funding landscape of published scholarship in the health sciences in the past two decades shadowed by political contestation. This study sought to characterize the number and sources of funding for firearm injury and violence articles published in health sciences journals, with respect to quantity and funding source, from 2000 through 2019.

Methods

We performed a scoping review of original, empirical, peer-reviewed articles related to firearm injury or violence published in health science journals between 2000 and 2019, using the PRISMA extension for Scoping Review checklist. We identified declared funding sources for all articles meeting our inclusion criteria and conducted descriptive analyses to characterize the number of articles that had explicitly declared funding, no funding, or no explicit declaration. Among articles with funding, we examined proportions by funding source.

Results

We identified 812 articles meeting our inclusion criteria. The number of articles published annually ranged from a low of 11 in 2008 to a high of 162 in 2019. About 119 (14.7%) of the articles explicitly declared not having received any funding, and about 240 (29.6%) had no explicit funding declaration. 453 (55.8%) of the included articles declared at least one source of funding. Of these, 232 (51.2%) reported at least one federal grant, and 238 (52.5%) reported at least one philanthropic grant. We observed a dramatic increase in the number of published articles beginning in 2017. While the volume increased over time from 2000 through 2019, the proportion of articles with funding was lower in 2019 (55.6%) than it was in 2000 (87.5%).

Conclusion

The number of firearm injury and violence articles published in health sciences journals has notably increased since 2017; however, the proportion of those with funding has declined compared to 2000. More resources are required for the field to recover from the dearth of funding in prior years.

Introduction

Partly in reaction to a study linking home gun ownership with the risk of homicide at home[1], Congress passed an appropriations bill in 1996 which included a rider, known as the Dickey Amendment, restricting the Centers for Disease Control and Prevention (CDC) from using funds to "advocate or promote gun control."[2] Starting in fiscal year 1997, this bill reallocated the CDC's $2.6 million budget for firearm injury and violence research in the previous years to traumatic brain injury research. In the years following, similar restrictions were extended to all Department of Health and Human Services agencies, including the National Institutes of Health (NIH).[1] Subsequently, CDC spending on firearm injury and violence research fell by 96% through 2012, potentially discouraging new investigators to join a field with an already limited number of researchers.[3,4] A previous study found that the annual number of firearm injury and violence research articles increased between 1985 and 1999, plateaued from 1999 through 2012, and then increased markedly over the last two years of that study in 2013 and 2014.[4] Firearm injury and violence research has received far less funding and has fewer published research articles than other leading causes of death in the United States.[5] For instance, compared to other leading causes of death, firearm injury and violence research received only 1.6% of the funding predicted and only 4.5% of the predicted volume of research articles.[5]

After 1997, several acts of violence involving firearms captured the nation's attention and sparked a resurgence in mostly unsuccessful congressional efforts to remove barriers for federally funded research on firearms. In 2013, not long after the Sandy Hook shooting,

President Obama released an executive plan of 23 executive actions which included a memorandum directing the CDC to conduct or support firearm injury and violence research.[6,7] However, no appropriation to allocate funds for this specific purpose was made by the Congress at that time. The call for funding reemerged in 2016 through another set of executive actions and the insistence by some senators for the appropriations subcommittee to remove the Dickey Amendment as a rider for the 2017 budget and to earmark $10 million for CDC research on firearm injury and violence, which did not materialize.[8,9] In 2018, Congress updated the language of the Dickey Amendment in the Omnibus spending bill to read as: "…the CDC has the authority to conduct research on the causes of gun violence."[10,11] Finally, a spending bill including $25 million for studies of gun violence supported by the CDC and NIH was approved by the Congress in 2019.[12]

While non-federal funding sources for firearm injury and violence research existed prior the Dickey Amendment, the political stalemate in Congress over the last two decades spurred some state and local governments, foundations, and universities to try to partially fill this research gap by pledging funds for firearm injury and violence research. In 2011, the Joyce Foundation, along with several other foundations, established the Fund For A Safer Future to implement strategies and produce research that may help reduce gun injuries and deaths.[13] The Hope and Heal Fund, established in 2016 in the aftermath of the shooting in San Bernardino, California, invested more than $1 million toward efforts to reduce gun violence.[14] In 2018, following the Parkland shooting, Arnold Ventures pledged $20 million to fund firearm injury and violence research through the National Collaborative on Gun Violence Research.[15] Kaiser Permanente also promised $2 million toward firearm injury and death research.[16] Since 2017,

California, New Jersey, and Washington state legislatures have each allocated funds establishing their own firearm injury and violence research centers.[17] Such efforts in the last decade likely contributed to the continued "survival" of firearm injury and prevention research, but little is known of the funding landscape of the field's published research.

We systematically characterized the status and type of funding for firearm injury and violence research articles published in health sciences journals. In quantifying the number of firearm injury and violence research articles over time and describing the status and type of funding, we sought to better understand how researchers in health sciences continued their work without having much dedicated funding for this specific area of scholarship from the federal government or other sources.

Methods

Using a search query developed by the authors and a University of Washington Health Sciences Librarian, we searched through health sciences journals indexed in PubMed to identify peer-reviewed research articles related to firearm injury or violence published (either in print or e-published) any time from January 1, 2000 through December 31, 2019 (Appendix 1).

Full text of the articles were uploaded to Rayyan, a web-based systematic review program, and reviewed for duplicates.[18] Using the PRISMA extension for Scoping Review guidelines, each research article was reviewed twice by authors (SG, HM, MB, PP). [19] The authors met weekly to discuss the inclusion criteria and to ensure consistency of decisions. Articles with conflicting decisions among the authors were shared with another author (ARR) who helped make the final decision.

Our methodology was informed by the one used in Harvard Injury Control Research Center's Firearm Researcher Survey.[20] Included articles were original, empirical research articles that explicitly mentioned firearms or a firearm-related term in the title or abstract (i.e., *gun, handgun, firearm, rifle, long gun, shotgun, shooting, semi-automatic*). To avoid the inclusion of articles that mentioned a firearm without centrally focusing on it, the article's core objective had to address the causes, consequences, prevention, or characterization of firearm injury or violence in the United States, or compare the United States' firearm injury or violence with other countries. The articles had to be authored by at least one U.S.-based researcher for inclusion.

We excluded non-empirical articles, such as book reviews, editorials, commentaries, historical articles; case reports or case series articles on the impact, management, or treatment of bullet wounds; law and forensic science articles; articles focused on non-powder guns (i.e., nail, air, mole, or electron guns); police, military, or sport firearm training; and, articles examining the psychology of perpetrators of violence. Intramural federal and state governmental reports, such as articles led entirely by CDC scientists, state or local public health professionals were excluded for two reasons. First, these articles were part of routine public health surveillance work that does not depend on extramural funding, and, second, extramural researchers did not typically receive funding for this work.

After an initial review for inclusion, the included research articles were reviewed again for explicit evidence of funding. The reviewers examined the full text of the published articles for a funding declaration section or for wording that explicitly mentioned funding or financial support in the Acknowledgements, Conflict of Interest, Disclosure sections, or the main text.

Journals varied with the presentation and wording of this information. The lack of consistency around the use of the Conflict of Interest, Acknowledgements, and Disclosure sections across journals prompted us to rely only on explicit mentions of a funding source. Acknowledgements of "support" from foundations or academic institutions were interpreted as having funding. Articles were marked as having "no funding" when there was explicit language stating such (i.e., "*These authors have no support or funding to report")*.[21,22]

Research articles without an explicit declaration of funding source were documented as having "no explicit declaration". Secondary analyses reporting funding were reviewed to differentiate between funding for the original data collection and analysis and funding for the secondary analysis. Supplementary information not directly within the full text was not reviewed.

Included research articles were subsequently categorized by funding source type defined as: federal, non-federal government, philanthropic, academic, and other. Funding from a federal research branch or department was categorized as a federal funding source. Non-federal government funding included funding from state and local municipalities. Philanthropic funding sources included funding from foundations and not-for-profit organizations. Academic funding was defined as coming from a college or university-based funding source awarded to a group or an individual (i.e., research center, university-wide grant, or fellowship, etc.). Other funding included self-funded research, grants from outside of the U.S., for-profit companies, professional associations, and hospitals.[23,24,25,26,27,28,29] Where possible, the funding source name, grant ID, and sponsored individual or group was noted.

We characterized the number of included research articles that had funding, no funding or no explicit declaration. Among research articles with funding, we examined proportions by the funding source and the counts of top mentioned funding sources. Data analyses were conducted using R v3.6.0 software.

Results

A total of 6,266 articles were screened from our PubMed search query. After removing duplicates, 6,250 articles were assessed for eligibility based on the defined inclusion criteria. We excluded 5,438 articles leaving 812 firearm injury or violence research articles in this scoping review (Figure 1).

There were 937 funding sources declared between 2000 and 2019 resulting in an average 2.1 funding sources declared per funded research paper (Median=2; Mode=1; IQR=1-3). One research article had ten funding sources.[30] Nearly 56% of the included research articles declared at least one source of funding. Of the 812 research articles, 119 (14.7%) articles explicitly declared not having received any funding for the study, 240 (29.6%) articles did not have any explicit mention of funding, and 453 (55.8%) explicitly declared funding (Table 1). Among the research articles with funding, 232 (51.2%) articles reported having at least one federal grant, 238 (52.5%) had at least one grant from a philanthropic organization, 34 (7.5%) reported at least one grant from a non-federal government entity, 75 (16.6%) reported at least one grant from an academic institution or research group, and 38 (8.4%) reported at least one grant from another source.

The count of firearm injury and violence research articles with funding increased over time, especially since 2017 (Figure 2); however, the proportion of articles with funding was lower in 2019 (55.6%) than it was in 2000 (87.5%; proportion difference: 31.9%; 95% CI: 16.7%-47.2%).

During the 20-year study period, the NIH and CDC were the most mentioned federal funding sources, with 192 and 64 mentions of funding, respectively (Appendix 2). Within the NIH, the National Institutes on Drug Abuse (n=37), Alcohol Abuse and Alcoholism (n=25), Mental Health (n=45), and Child Health and Human Development (n=35) were the most mentioned sources of funding. Most mentions of CDC funding (n=47) did not provide a specific center, but when specified, they were associated with the National Center for Injury Control and Prevention (n=15). Other federal sources of funding included the National Institute of Justice, Department of Veterans Affairs, and Maternal and Child Health Bureau under the Department of Health and Human Services.

Among research articles that declared philanthropic funding sources, 52% (124) declared financial support from the Joyce Foundation (Appendix 2). The Robert Wood Johnson Foundation was the second most mentioned foundation with 54 research articles declaring their support. Other top foundations included the California Wellness Foundation, the David and Lucile Packard Foundation, the Fund for a Safer Future, and the Open Society Institute.

State funding came from California[31–33], Illinois[34], Massachusetts[35], Michigan[36], Minnesota[37], New Hampshire[26], New York[38,39], Oregon[40], Ohio[41], Pennsylvania[42–44], and Washington[45]. The Cities of Seattle[46] and Baltimore[47] provided funding for firearm injury and prevention research. Among research articles categorized as having other sources of funding,

we identified a handful of self-funded articles from four researchers[23,24,48], and several articles declaring funding from foreign academic groups.[27,28,49–54]

Discussion

This study is the first, to our knowledge, to characterize funding status and type of published scholarship for firearm injury and violence in health sciences through a scoping review. While the volume of original, empiric research (funded and unfunded) more than tripled from 2000 through 2019, the number of articles reporting funding was about 30% lower in 2019 than it was in 2000. It is possible that the number of research articles reporting funding in 2000 were buoyed by pre-Dickey Amendment funding from the CDC.

The overall increase of articles, especially since 2017, may be partially due to an increased interest by journal editors in firearm injury and violence research who actively looked for papers and created edited volumes focused on firearms. This may be in response to a culmination of many factors, such as President Obama's executive actions and members of Congress calls for funding removing the Dickey Amendment in 2016. During this same period, we also saw an increase in unfunded articles. This may be the result of an increased interest among researchers in firearm injury and violence research following public mass shooting events and continually high rates of firearm injury and violence in the U.S. These researchers may have leveraged public data, minimizing the cost of research, where possible.

NIH funding was the most mentioned funding source and one that consistently provided funding during the study period. This suggests how researchers cross-subsidized their firearm research with non-firearm research, such as studying suicide, adolescent health, mental health,

and injuries more generally. We would expect some data collection related to firearms during more broad studies (i.e., assessments around access to lethal means).

It is noteworthy that the Joyce Foundation, a Chicago-based foundation focused on grantmaking in the Great Lakes region, has supported nearly a third of the 453 funded, empirical research consistently throughout the last two decades, buoying many long-time academic researchers. A recent report released from the foundation echoed these findings.[55] Since 1993, the Joyce Foundation has committed $32 million in research grants resulting in 240 peer-reviewed research publications. At a less consistent cadence, but still important, the Robert Wood Johnson Foundation also consistently made research possible during our study period through programs like its Clinical Scholars Fellowships and the Evidence for Action Program.

Increased public and media attention to firearm-related issues mixed with the recent increase in academic scholarship and newly available funding hints at a new momentum for the field. As the CDC and NIH have now awarded the FY 2020 earmarked funds for firearm research, we anticipate that this positive trend will continue. Still, compared to other leading causes of death, the field still has a gap in scholarship and funding and greater strides could be made to address them, such as training junior scholars and improving the availability and accessibility to firearm-related data. [56,57]

This study had some limitations. The number of articles with funding do not represent the number of awards or the dollar mount issued between 2000 and 2019. It is possible that funding from a single source (e.g., one grant) was used to produce several articles, but without grant ID numbers from every funding source identified, it is difficult to know. Without

consistent guidelines and requirements from journals around funding disclosures, there are limitations to our ascertainment of funding and funding sources for the articles reviewed. We reviewed all disclosure statements included in the articles. In limiting our scoping review to PubMed, we did not include funded firearm injury and violence articles that were published in criminology, sociology, or other journals. Some researchers may have found it less challenging to secure funding for firearm injury and violence research through these fields over the last two decades since federal funding from sources like NIJ were not restricted by the Dickey Amendment. They may have subsequently published their articles in non-health sciences journals. Therefore, this study is only representative of the funding landscape within the health sciences.

Future analyses can examine authorship "clusters" among funded studies to determine if specific research groups/authors made up a notable proportion of the funded studies, or examine federal funding "clusters" based on award grant ID information (where available) to determine if the number of funded projects during this time period could be estimated. Building on previous research, a comparison of the results from this review with scholarship from other leading causes of death during this same time period may provide additional context to the field's dearth of funding and growing volume of research articles.[4] This study may also provide a baseline for comparison with firearm research funding during this next decade

This study's findings illustrate the limited amount of funding available for firearm researchers in the U.S. over the past two decades and the creative ways in which researchers pulled together funding to research a major public health problem. Information from this study

may serve as a baseline for comparison in future studies that will monitor the funding landscape for firearm injury and violence research and inspire those new to this field to contribute to it after having learned the tale of “survival” and innovation by those before them.

References

1. Kellermann AL, Rivara FP. Silencing the science on gun research. *JAMA*. 2013;309(6):549-550. doi:10.1001/jama.2012.208207. Accessed November 11, 2020.

2. A bill making omnibus consolidated rescissions and appropriations for the fiscal year ending September 30, 1996, and for other purposes. 1996. http://www.gpo.gov/fdsys/pkg/PLAW-104publ208/pdf/PLAW-104publ208.pdf. Accessed November 11, 2020.

3. Mayors Against Illegal Guns. Access denied: How the gun lobby is depriving police, policymakers, and the public of the data we need to prevent gun violence. 2013. http://libcloud.s3.amazonaws.com/9/c1/6/1017/3/access_denied.pdf. Accessed November 11, 2020.

4. Alcorn T. Trends in research publications about gun violence in the United States, 1960 to 2014. *JAMA Intern Med*. 2017;177(1):124-126. doi:10.1001/jamainternmed.2016.7076. Accessed November 11, 2020.

5. Stark DE, Shah NH. Funding and publication of research on gun violence and other leading causes of death. *JAMA*. 2017;317(1):84-85. doi:10.1001/jama.2016.16215. Accessed November 11, 2020.

6. The President's plan to protect our children and our communities by reducing gun violence. Obamawhitehouse.archives.gov. https://obamawhitehouse.archives.gov/sites/default/files/docs/wh_now_is_the_time_full.pdf. Published January 16, 2013. Accessed November 11, 2020.

7. Presidential memorandum: Engaging in public health research on the causes and prevention of gun violence. Obamawhitehouse.archives.gov. https://obamawhitehouse.archives.gov/the-press-office/2013/01/16/presidential-memorandum-engaging-public-health-research-causes-and-preve. Published January 16, 2013. Accessed November 11, 2020.

8. Lopez G. President Obama's boldest action on guns yet, explained. *Vox*. https://www.vox.com/2016/1/4/10708324/obama-gun-control-executive-order. Published January 7, 2016. Accessed November 17, 2020.

9. Rubin R. Senators urge appropriation of funds for gun violence research at the CDC. *JAMA*. 2016;315(18):1938. doi:10.1001/jama.2016.5311. Accessed November 17, 2020.

10. He K, Sakran J V. Elimination of the moratorium on gun research is not enough: The need for the CDC to set a budgetary agenda. *JAMA Surg*. 2019;154(3):195-196. doi:10.1001/jamasurg.2018.4211. Accessed November 11, 2020.

11. Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations for Fiscal Year 2018: Hearings before a Subcommittee of the Committee on Appropriations, United States Senate, One Hundred Fifteenth Congress, First Session, on H.R. 3358/S. 1771, an Act Making Appropriations for the Departments of Labor, Health and Human Services, and Education, and Related Agencies for the Fiscal Year Ending September 30, 2018, and for Other Purposes.2018. https://docs.house.gov/billsthisweek/20180319/DIV H LABORHHS SOM FY18 OMNI.OCR.pdf. Accessed November 11, 2020.

12. Subbaraman N. United States to fund gun-violence research after 20-year freeze. *Nature*. 2020;577(7788):12. doi:10.1038/d41586-019-03882-w

13. Fund for a Safer Future. Who we are. Fundforasaferfuture.org. https://www.fundforasaferfuture.org/who-we-are/. Accessed October 3, 2020.

14. Hope and Heal Fund. Who we are. Hopeandhealfund.org. https://hopeandhealfund.org/who-we-are/#our-story. Accessed October 3, 2020.

15. Laura and John Arnold Foundation. Research collaborative formed to study gun violence. https://www.prnewswire.com/news-releases/research-collaborative-formed-to-study-gun-violence-300657452.html. Published May 31, 2018. Accessed October 2, 2020.

16. Kaiser Permanente. Kaiser Permanente commits $2 million to gun injury prevention research. Kaiserpermanente.org. https://share.kaiserpermanente.org/article/kaiser-permanente-commits-2-million-to-gun-injury-prevention-research/. Published April 9, 2018. Accessed November 11, 2020.

17. Van Brocklin E. States are funding the gun violence research the feds won't. Thetrace.org. https://www.thetrace.org/2019/01/state-gun-violence-research-california-new-jersey/. Published January 29, 2019. Accessed November 11, 2020.

18. Ouzzani M, Hammady H, Fedorowicz Z, et al. Rayyan: A web and mobile app for systematic reviews. *Syst Rev*. 2016;5(1):210. doi:10.1186/s13643-016-0384-4. Accessed November 11, 2020.

19. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Ann Intern Med*. 2018;169(7):467-473. doi:10.7326/m18-0850 %m 30178033. Accessed November 11, 2020.

20. Hemenway D, Nolan EP. The scientific agreement on firearm issues. *Inj Prev*. 2017;23(4):221-225. doi:10.1136/injuryprev-2016-042146. Accessed November 11, 2020.

21. O'Brien K, Forrest W, Lynott D, Daly M. Racism, gun ownership and gun control: biased attitudes in US whites may influence policy decisions. *PLoS One*. 2013;8(10):e77552. doi:10.1371/journal.pone.0077552. Accessed November 11, 2020.

22. Ruggles K V, Rajan S. Gun possession among American youth: a discovery-based approach to understand gun violence. *PLoS One*. 2014;9(11):e111893. doi:10.1371/journal.pone.0111893. Accessed November 11, 2020.

23. Khubchandani J, Wiblishauser M, Price JH, Thompson A. Graduate psychiatric nurse's training on firearm injury prevention. *Arch Psychiatr Nurs*. 2011;25(4):245-252. doi:10.1016/j.apnu.2010.07.010. Accessed November 11, 2020.

24. Thompson A, Price JH, Khubchandani J, Bryant M, Reindl D, Hogue P. Physician assistants training on firearm injury prevention. *Patient Educ Couns*. 2012;86(3):348-353. doi:10.1016/j.pec.2011.06.009. Accessed November 11, 2020.

25. Fallucco EM, Joseph MM, Leung K, Smotherman C, Robertson Blackmore E. Post-Parkland shooting: Development and assessment of experiential training in adolescent depression and post-traumatic stress disorder for primary care providers. *Acad Pediatr*. 2020;20(3):430-432. doi:10.1016/j.acap.2019.10.013. Accessed November 11, 2020.

26. Vriniotis M, Barber C, Frank E, Demicco R. A suicide prevention campaign for firearm dealers in New Hampshire. *Suicide Life Threat Behav*. 2015;45(2):157-163. doi:10.1111/sltb.12123. Accessed November 11, 2020.

27. Prickett KC, Martin-Storey A, Crosnoe R. State firearm laws, firearm ownership, and safety practices among families of preschool-aged children. *Am J Public Health*. 2014;104(6):1080-1086. doi:10.2105/AJPH.2014.301928. Accessed November 11, 2020.

28. Castillo-Carniglia A, Kagawa RMC, Webster DW, Vernick JS, Cerdá M, Wintemute GJ. Comprehensive background check policy and firearm background checks in three US states. *Inj Prev*. 2018;24(6):431-436. doi:10.1136/injuryprev-2017-042475. Accessed November 11, 2020.

29. Bandealy A, Herrera N, Weissman M, Scheidt P. Use of lethal means restriction counseling for suicide prevention in pediatric primary care. *Prev Med.* 2020;130:105855. doi:10.1016/j.ypmed.2019.105855. Accessed November 11, 2020.

30. Ladapo JA, Elliott MN, Kanouse DE, et al. Firearm ownership and acquisition among parents with risk factors for self-harm or other violence. *Acad Pediatr*. 2016;16(8):742-749. doi:10.1016/j.acap.2016.05.145. Accessed November 11, 2020.

31. Kravitz-Wirtz N, Pallin R, Miller M, Azrael D, Wintemute GJ. Firearm ownership and acquisition in California: findings from the 2018 California Safety and Well-being Survey. *Inj Prev*. December 2019. doi:10.1136/injuryprev-2019-043372. Accessed November 11, 2020.

32. Schleimer JP, Kravitz-Wirtz N, Pallin R, Charbonneau AK, Buggs SA, Wintemute GJ. Firearm ownership in California: A latent class analysis. *Inj Prev*. 2020;26(5):456-462. doi:10.1136/injuryprev-2019-043412. Accessed November 11, 2020.

33. Pallin R, Charbonneau A, Wintemute GJ, Kravitz-Wirtz N. California public opinion on health professionals talking with patients about firearms. *Health Aff*. 2019;38(10):1744-1751. doi:10.1377/hlthaff.2019.00602. Accessed November 11, 2020.

34. Walker GN, McLone S, Mason M, Sheehan K. Rates of firearm homicide by Chicago region, age, sex, and race/ethnicity, 2005-2010. *J Trauma Acute Care Surg*. 2016;81(4 Suppl 1):S48-53. doi:10.1097/TA.0000000000001176. Accessed November 11, 2020.

35. Kacanek D, Hemenway D. Gun carrying and drug selling among young incarcerated men and women. *J Urban Health*. 2006;83(2):266-274. doi:10.1007/s11524-005-9022-5. Accessed November 11, 2020.

36. Meyer G, Roberto AJ, Atkin CK. A radio-based approach to promoting gun safety: process and outcome evaluation implications and insights. *Health Commun*. 2003;15(3):299-318. doi:10.1207/S15327027HC1503_3. Accessed November 11, 2020.

37. Roesler J, Ostercamp M. Pediatric firearm injury in Minnesota, 1998. Fatal and nonfatal firearm injuries among Minnesota youth. *Minn Med*. 2000;83(9):57-60. Accessed November 11, 2020.

38. Hardiman ER, Jones L V, Cestone LM. Neighborhood perceptions of gun violence and safety: Findings from a public health-social work intervention. *Soc Work Public Health*. 2019;34(6):492-504. doi:10.1080/19371918.2019.1629144. Accessed November 11, 2020.

39. Matoba N, Reina M, Prachand N, Davis MM, Collins JW. Neighborhood gun violence and birth outcomes in Chicago. *Matern Child Health J*. 2019;23(9):1251-1259. doi:10.1007/s10995-019-02765-w. Accessed November 11, 2020.

40. Wolsko C, Marino E, Keys S. Affirming cultural values for health: The case of firearm restriction in suicide prevention. *Soc Sci Med*. 2020;248:112706. doi:10.1016/j.socscimed.2019.112706. Accessed November 11, 2020.

41. Slovak K, Singer M. Gun violence exposure and trauma among rural youth. *Violence Vict*. 2001;16(4):389-400. Accessed November 11, 2020.

42. Beardslee J, Docherty M, Mulvey E, Pardini D. The direct and indirect associations between childhood socioeconomic disadvantage and adolescent gun violence. *J Clin child Adolesc Psychol*. August 2019:1-11. doi:10.1080/15374416.2019.1644646. Accessed November 11, 2020.

43. Beardslee J, Docherty M, Yang VJH, Pardini D. Parental disengagement in childhood and adolescent male gun carrying. *Pediatrics*. 2019;143(4). doi:10.1542/peds.2018-1552. Accessed November 11, 2020.

44. Docherty M, Beardslee J, Grimm KJ, Pardini D. Distinguishing between-individual from

within-individual predictors of gun carrying among Black and White males across adolescence. *Law Hum Behav*. 2019;43(2):144-155. doi:10.1037/lhb0000320. Accessed November 11, 2020.

45. Walton T, Stuber J. Firearm Retailers and Suicide: Results from a survey assessing willingness to engage in prevention efforts. *Suicide Life Threat Behav*. 2020;50(1):83-94. doi:10.1111/sltb.12574. Accessed November 11, 2020.

46. Lyons VH, Rivara FP, Yan AN-X, et al. Firearm-related behaviors following firearm injury: changes in ownership, carrying and storage. *J Behav Med*. 2019;42(4):658-673. doi:10.1007/s10865-019-00052-1. Accessed November 11, 2020.

47. Webster DW, Whitehill JM, Vernick JS, Curriero FC. Effects of Baltimore's Safe Streets Program on gun violence: A replication of Chicago's CeaseFire Program. *J Urban Health*. 2013;90(1):27-40. doi:10.1007/s11524-012-9731-5. Accessed November 11, 2020.

48. Price JH, Thompson AJ, Khubchandani J, Wiblishauser M. Psychiatric residency directors' perceptions of firearm access by the mentally ill in the United States. *J Community Health*. 2014;39(2):322-326. doi:10.1007/s10900-013-9764-z. Accessed November 11, 2020.

49. Martin-Storey A, Prickett KC, Crosnoe R. Family process correlates of firearm ownership and firearm storage among families with young children. *Matern Child Health J*. 2015;19(1):17-24. doi:10.1007/s10995-014-1490-3. Accessed November 11, 2020.

50. Martin-Storey A, Prickett KC, Crosnoe R. Alcohol use and change over time in firearm safety among families with young children. *Drug Alcohol Depend*. 2018;186:187-192. doi:10.1016/j.drugalcdep.2018.01.032. Accessed November 11, 2020.

51. Riddell CA, Harper S, Cerdá M, Kaufman JS. Comparison of rates of firearm and nonfirearm homicide and suicide in Black and white non-Hispanic men, by U.S. State. *Ann Intern Med*. 2018;168(10):712-720. doi:10.7326/M17-2976. Accessed November 11, 2020.

52. Castillo-Carniglia A, Kagawa RMC, Cerdá M, et al. California's comprehensive background check and misdemeanor violence prohibition policies and firearm mortality. *Ann Epidemiol*. 2019;30:50-56. doi:10.1016/j.annepidem.2018.10.001. Accessed November 11, 2020.

53. Wintemute GJ, Pear VA, Schleimer JP, et al. Extreme risk protection orders intended to prevent mass shootings: A case series. *Ann Intern Med*. 2019;171(9):655-658. doi:10.7326/M19-2162. Accessed November 11, 2020.

54. Kagawa RMC, Castillo-Carniglia A, Vernick JS, et al. Repeal of comprehensive background check policies and firearm homicide and suicide. *Epidemiology*. 2018;29(4):494-502. doi:10.1097/EDE.0000000000000838. Accessed November 11, 2020.

55. 25 years of impactful grant making: Gun violence prevention research supported by the Joyce Foundation. joycefdn.org. http://www.joycefdn.org/assets/images/Joyce_Report_v5.pdf. Published August 2019. Accessed November 11, 2020.

56. Galea S, Branas CC, Flescher A, et al. Priorities in recovering from a lost generation of firearms research. *Am J Public Health*. 2018;108(7):858-860. doi:10.2105/AJPH.2018.304436. Accessed November 11, 2020.

57. Rowhani-Rahbar A, Bellenger MA, Rivara FP. Firearm violence research: Improving availability, accessibility, and content of firearm-related data systems. *JAMA*. October 2019. doi:10.1001/jama.2019.16286. Accessed November 11, 2020.

Figure 1. PRISMA extension for Scoping Review Flow Chart

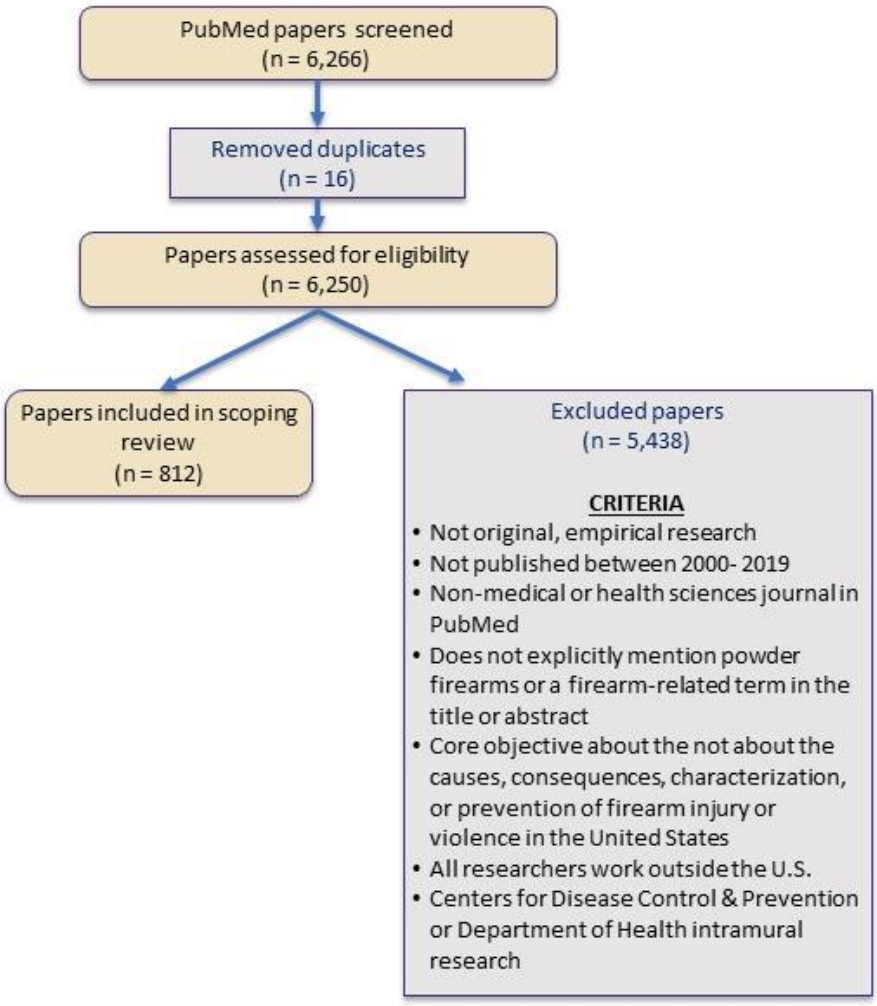


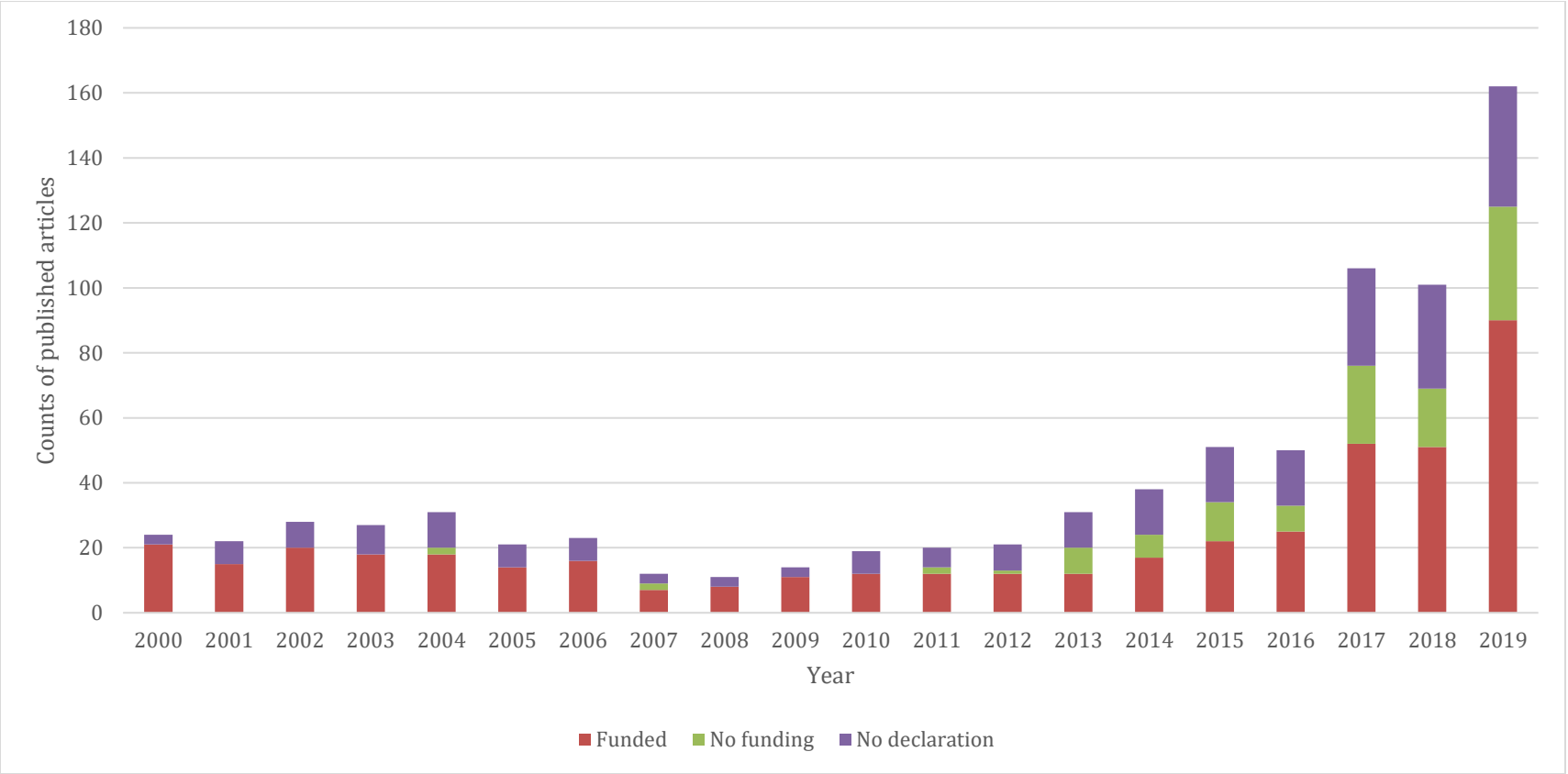
Table 1. Funding status and type among firearm research articles published from 2000 through 2019

	2000-2016		2017-2019		Total	
	(N=443)		**(N=369)**		**(N=812)**	
	n	*(%)*	*n*	*(%)*	*n*	*(%)*
Funded	260	58.7%	193	52.3%	453	55.8%
*Federal**	127	48.8%	94	48.7%	221	48.8%
*Philanthropy**	146	56.2%	86	44.6%	232	51.2%
*Non-federal Government**	19	7.3%	14	14.9%	33	7.3%
*Academic**	28	10.8%	48	24.9%	76	16.8%
*Other**	19	7.3%	14	7.3%	33	7.3%
No funding	42	9.5%	77	20.9%	119	14.7%
No declaration	141	31.8%	99	26.8%	240	29.6%

* Count and percent of funded articles among funded articles. The percent will add up to more than 100% since one article may have more than one funding source and may be counted more than once.

Table 1 shows the total counts and percentages of articles with funding, no funding, and with no funding declaration. Among the articles reporting funding, this table also shows the count and percentage of articles reporting at least one grant within each funding source category. Since many articles reported more than one funding source, the funding source category count and percentage will add up to more than the total number of articles funded.

Figure 2. Counts of articles by funding status from 2000 through 2019.



Appendix 1: PubMed Search Query

(firearms[mh] OR gunshot wounds[mh] OR firearm[tiab] OR firearms[tiab] OR gun violence[tiab] OR gunshot[tiab] OR "gun shot"[tiab] OR "gun injury"[tiab] OR "gun injuries"[tiab] OR "gun related"[tiab] OR "gun-related"[tiab] OR "gun crime"[tiab] OR "gun crimes"[tiab] OR "gun death"[tiab] OR "gun deaths"[tiab] OR "gun control"[tiab] OR "mass shootings"[tiab] OR "mass shooting"[tiab] OR "school shootings"[tiab] OR "school shooting"[tiab] OR handgun[tiab] OR handguns[tiab] OR "hand gun"[tiab] OR "hand guns"[tiab] OR "hand-gun"[tiab] OR "hand-guns"[tiab] OR "long gun"[tiab] OR "long-guns"[tiab] OR "shot gun"[tiab] OR "shot guns"[tiab] OR shotgun[tiab] OR shotguns[tiab] OR (gun[tiab] AND (weapon[tiab] OR weapons[tiab] OR weapons[mh] OR violence[tiab] OR violence[mh] OR shooting[tiab] OR shot[tiab] OR crime[tiab] OR crimes[tiab] OR victim[tiab] OR victims[tiab]))) AND English[la] AND 2000:2019[pdat] NOT (Europe[mh] OR Asia[mh] OR Africa[mh]) NOT (comment[pt] OR editorial[pt] OR case reports [pt] OR book review [pt] OR historical article [pt]) NOT (forensic science[mh] OR forensic[tiab]) NOT (animals[mh] NOT humans[mh]) NOT ("animal model" OR "animal models" OR "RIFLE criteria" OR proteomic* OR metagenomic* OR genomic* OR genome* OR "shotgun approach" OR "trouble shooting")

Appendix 2. Most mentioned federal and philanthropic funding sources among firearm research articles published from 2000 through 2019

	2000-2016		2017-2019		Total	
Federal Funding Sources	**(N=204)**		**(N=159)**		**(N=363)**	
	n	*(%)*	*n*	*(%)*	*n*	*(%)*
National Institutes of Health (NIH)						
National Institute of Mental Health	19	9.3%	26	16.4%	45	12.4%
National Institute on Drug Abuse	18	8.8%	19	11.9%	37	10.2%
National Institute of Child Health and Human Development	11	5.4%	24	15.1%	35	9.6%
National Institute on Alcohol Abuse and Alcoholism	17	8.3%	8	5.0%	25	6.9%
Other institute or office	19	9.3%	16	10.1%	35	9.6%
Not specified	4	2.0%	11	6.9%	15	4.1%
Centers for Disease Control and Prevention (CDC)						
National Center for Injury Control & Prevention	10	4.9%	5	3.1%	15	4.1%
Other specific division	2	1.0%	0	0.0%	2	0.6%
Not specified	44	21.6%	3	1.9%	47	12.9%
Department of Health and Human Services (DHHS)						
Agency for Healthcare Research and Quality	3	1.5%	0	0.0%	3	0.8%
Health Resources and Services Administration	4	2.0%	0	0.0%	4	1.1%
Health Resources and Services Administration, Maternal and Child Health Bureau	3	1.5%	8	5.0%	11	3.0%
Substance Abuse and Mental Health Services Administration	2	1.0%	4	2.5%	6	1.7%

Other DHHS office	3	1.5%	1	0.6%	4	1.1%
Department of Justice (DOJ)						
National Institute of Justice (NIJ)	22	10.8%	15	9.4%	37	10.2%
Office of Juvenile Justice and Delinquency Prevention	4	2.0%	3	1.9%	7	1.9%
Other DOJ Office	3	1.5%	2	1.3%	5	1.4%
Not specified	1	0.5%	0	0.0%	1	0.3%
Department of Veterans Affairs (VA)						
Health Services Research and Development Service	2	1.0%	2	1.3%	4	1.1%
Other Office	0	0.0%	4	2.5%	4	1.1%
Not Specified	6	2.9%	2	1.3%	8	2.2%
National Science Foundation (NSF)	4	2.0%	3	1.9%	7	1.9%
Other federal source	3	1.5%	3	1.9%	6	1.7%
	2000-2016		2017-2019		Total	
Foundations and Philanthropies Sources	**(N=282)**		**(N=124)**		**(N=406)**	
	n	*(%)*	*n*	*(%)*	*n*	*(%)*
Joyce Foundation	91	32.3%	33	26.6%	124	30.5%
Robert Wood Johnson Foundation	42	14.9%	12	9.7%	54	13.3%
California Wellness Foundation	21	7.4%	11	8.9%	32	7.9%
David and Lucile Packard Foundation	22	7.8%	0	0.0%	22	5.4%
Fund for a Safer Future	1	0.4%	17	13.7%	18	4.4%
Open Society Institute	17	6.0%	0	0.0%	17	4.2%
Heising-Simons Foundation	0	0.0%	16	12.9%	16	3.9%
John D. and Catherine T. MacArthur Foundation	13	4.6%	1	0.8%	14	3.4%

William T. Grant Foundation	8	2.8%	0	0.0%	8	2.0%
Eli and Edythe L. Broad Foundation	8	2.8%	0	0.0%	8	2.0%
Other Foundation or philanthropy	59	20.9%	34	27.4%	93	22.9%

Appendix 2 summarizes the number of mentions of a specific funding source within the federal and philanthropic funding categories. Every mention of a funding source was counted. The total number of mentions will be more than the count reported in Table 1.