

Costs of Gun Violence in Washington, DC

Methodology Appendix

Emily Tiry and Arielle Jackson

July 2022

Gun violence and violent crime more generally impose substantial costs on communities, including in Washington, DC. The Cost of Gun Violence in Washington, DC, project examined research on the broader community-level costs of gun violence on (1) economic indicators such as business activity and the housing market and (2) educational outcomes such as test scores and graduation rates. We also summarized the extent of gun violence, economic indicators, and educational outcomes in Washington, DC, using publicly available data and, to the extent possible, we put the costs in dollar terms. This appendix outlines our methodologies for our “Economic Costs of Gun Violence in Washington, DC” fact sheet and “Educational Costs of Gun Violence: Implications for Washington, DC” brief (Jackson et al. 2022; Tiry, Jackson, and Thompson 2022).

Economic Costs of Gun Violence in Washington, DC

To assess the economic costs of gun violence, we conducted a review of the available literature to identify relevant research on the impact of gun violence on a range of economic indicators, including business openings and closures, employment, business revenue, and property values. We identified and reviewed 20 articles. For each article, we catalogued data sources, outcome measures, methodology, and findings. Of the 20 articles, 12 examined the impact of violent crime, including gun violence, on economic outcomes. Of those 12 articles, 5 used economic outcomes and crime data that we were able to replicate or approximate to conduct the interim analyses. Based on the results of this research, we developed estimates of the community-level economic costs of gun violence in the District of Columbia in two key areas: the number of retail or service establishments and home prices.

We calculated several estimates, each assuming a different level of decrease in the gun violence metric of interest (i.e., reduced by one unit or reduced by 10 percent). To do this, we first calculated what that reduction would be, then we multiplied that number by the effect coefficient reported in the relevant study. We then added that amount to the original amount of the economic indicator. For example, Irvin-Erickson and colleagues (2017) reported that each additional gun homicide resulted in two fewer retail and service establishments the next year. So we first calculated 10 percent of the number of gun homicides in 2018 ($122 * 0.10 = 12.2$). We then multiplied this number by 2 ($12.2 * 2 = 24.4$) and added the result to the original number of retail and service establishments in DC in 2019 ($28619 + 24.4 = 28643.4$). For studies that used crime rates instead of number of crimes, we calculated the result if the crime rate decreased by one crime per population and then noted how many crimes that translated to. For example, a decrease of one violent crime per 100,000 population, as defined by Hipp, Tita, and Greenbaum (2009), equals seven fewer violent crimes (or a 0.2 percent reduction).

TABLE 1

Estimated Effects of Gun Violence and Violent Crime on Economic Outcomes in Washington, DC

Economic Outcome		Gun Violence Measure				Outcome If Gun Violence Measure Is Reduced by		Source
Outcome	Value	Data year	Measure	Value	Measure year	1 unit	10 percent	
Number of retail/service establishments	28,619	2019	Gun homicides	122	2018	28,621	28,643	Erickson et al. (2017)
Median home sale price	\$596,485	2019	Violent crime rate per 100,000 population	547.1	2018	\$606,208	n/a	Hipp, Tita, and Greenbaum (2009)
Median home sale price	\$596,485	2019	Violent crime rate per 1,000 population	5.9	2018	\$597,457	n/a	Tita, Petras, and Greenbaum (2006)
Median home sale price	\$596,485	2019	Homicides	160	2018	\$605,552	\$741,550	Shapiro and Hassett (2012)
Median home sale price	\$596,485	2019	Homicides	164	2019	\$610,204	\$815,991	Rhynhart (2019)

Sources: Yasemin Irvin-Erickson, Matthew Lynch, Annie Gurvis, Edward Mohr, and Bing Bai, *A Neighborhood-Level Analysis of the Economic Impact of Gun Violence* (Washington, DC: Urban Institute, 2017); John R. Hipp, George E. Tita, and Robert T. Greenbaum, "Drive-Bys and Trade-Ups: Examining the Directionality of the Crime and Residential Instability Relationship," *Social Forces* 87, no. 4 (2009): 1778–812; George E. Tita, Tricia L. Petras, and Robert T. Greenbaum, "Crime and Residential Choice: A Neighborhood Level Analysis of the Impact of Crime on Housing Prices," *Journal of Quantitative Criminology* 22, no. 4 (2006): 299–317; Robert J. Shapiro and Kevin A. Hassett, *The Economic Benefits of Reducing Violent Crime: A Case Study of 8 American Cities* (Washington, DC: Center for American Progress, 2012); Rebecca Rhynhart, *Report on the Economic Impact of Homicides* (Philadelphia: Philadelphia Office of the Controller, 2019).

Note: n/a = not calculated.

We drew data on the number of retail and service establishments in DC from the US Bureau of Labor Statistics' Quarterly Census of Employment and Wages for 2019.¹ We used annual averages and limited the establishments to the retail and service establishment categories included in Irvin-Erickson and colleagues (2017): Standard Industrial Classification (SIC) codes 52–59, 70, 72, 73, 75, 76, 78, 79, 80–84, 86, 87, and 89. We developed the median home sale price from a subset of DC's Integrated Tax System Public Extract that represents real property sales in DC.² We calculated the median sale price of residential properties (land-use codes 002–029, 116–127) last sold in 2019. We developed crime indicators using 2018 and 2019 crime incident data for DC.³ To be consistent with the different definitions used across studies, we calculated two violent crime rates. Hipp, Tita, and Greenbaum (2009) defines “violent crimes” as aggravated assaults, homicides, and robberies, and there were 3,843 of these crimes reported in DC in 2018. Using the US Census Bureau's estimated population of DC in 2018 of 702,455, we calculated a violent crime rate of 547.1 per 100,000 population. Tita, Petras, and Greenbaum (2006) defines “violent crimes” as homicides, rapes, robberies, and aggravated assaults, and there were 4,118 of these crimes reported in DC in 2018. Using this definition, we calculated a violent crime rate of 5.9 violent crimes per 1,000 population.

Educational Costs of Gun Violence in Washington, DC

Similar to our review of research on the economic costs of gun violence, we also reviewed the literature on how gun violence affects educational outcomes and how educational outcomes may affect future earnings. We reviewed 23 studies and catalogued the data sources, outcome measures, methodology, and findings of each. Sixteen of these studies contained relevant information. However, because of these studies' designs and limitations in the publicly available data, we could not develop monetary cost estimates in the same way we did for the community-level economic outcomes.

Instead, we used the publicly available data to describe the distribution of gun violence and negative educational outcomes across the city. To understand the prevalence of gun violence in DC, our team used crime incident data from Open Data DC. We pulled datasets for both 2019 and 2020,⁴ the most recently available years. Both crime incident datasets included the ward, offense, method, time of day, report date, and a unique identification number. For each ward, we counted the number of total crimes involving a gun and the number of gun homicides.

To examine educational outcomes, our team used test score data from DC's Office of the State Superintendent of Education for the 2018–19 school year.⁵ The two annual assessments captured in the data were the PARCC (Partnership for Assessment of Readiness for College and Careers) and the MSAA (Multi-State Alternate Assessment). The PARCC is administered to students in grades 3 through

12 each spring to assess mathematics and English language arts/literacy (ELA). Similarly, the MSAA assesses proficiency in mathematics and ELA, and it is administered to students in grades 3 through 8 and grade 11. The metrics in this dataset included subject, student group, percentage of students meeting or exceeding proficiency, school ward, and tested grade. For both math and ELA, we calculated the average percentage of students meeting or exceeding expectations within each ward.

To evaluate graduation rates and postsecondary enrollment rates in the District, we pulled data from the 2020 DC School Report Card public dataset.⁶ The dataset provides four- and five-year graduation rates and postsecondary enrollment metrics. For each metric, we again calculated the average for all high schools (both public and charter) within each ward.

The analyses reflect all schools in the District and whose scores were reported to the District of Columbia Public Schools system, which includes traditional public schools and public charter schools. The data capture only information on the school's location, rather than where students live. In some cases, students may live in a different ward than the one where they attend school. In these cases, students may be experiencing different levels of violence during and outside school hours.

Notes

- ¹ See the 2019 annual average by area file available at "Quarterly Census of Employment and Wages," US Bureau of Labor Statistics, accessed April 12, 2022, <https://www.bls.gov/cew/downloadable-data-files.htm>.
- ² "Integrated Tax System Public Extract," Open Data DC, accessed April 12, 2022, <https://opendata.dc.gov/datasets/496533836db640bcade61dd9078b0d63/explore>.
- ³ "Crime Incidents in 2018," Open Data DC, accessed April 12, 2022, <https://opendata.dc.gov/datasets/DCGIS::crime-incidents-in-2018/about>; "Crime Incidents in 2019," Open Data DC, accessed June 10, 2022, <https://opendata.dc.gov/datasets/DCGIS::crime-incidents-in-2019/about>.
- ⁴ "Crime Incidents in 2019," Open Data DC; "Crime Incidents in 2020," Open Data DC, accessed June 10, 2022, <https://opendata.dc.gov/datasets/DCGIS::crime-incidents-in-2020/about>.
- ⁵ "2018-2019 PARCC Results and Resources," Office of the State Superintendent of Education for the District of Columbia, accessed April 12, 2022, <https://osse.dc.gov/page/2018-19-parcc-results-and-resources>.
- ⁶ See the graduation and college enrollment metrics file available at "2020 DC School Report Card Resource Library," Office of the State Superintendent of Education for the District of Columbia, accessed April 8, 2022, <https://osse.dc.gov/page/dc-school-report-card-resource-library>.

References

- Hipp, John R., George E. Tita, and Robert T. Greenbaum. 2009. "Drive-Bys and Trade-Ups: Examining the Directionality of the Crime and Residential Instability Relationship." *Social Forces* 87 (4): 1778–812.
- Irvin-Erickson, Yasemin, Matthew Lynch, Annie Gurvis, Edward Mohr, and Bing Bai. 2017. *A Neighborhood-Level Analysis of the Economic Impact of Gun Violence*. Washington, DC: Urban Institute.
- Jackson, Arielle, Emily Tiry, Paige S. Thompson, and Jesse Jannetta. 2022. "Educational Costs of Gun Violence: Implications for Washington, DC." Washington, DC: Urban Institute.
- Rhynhart, Rebecca. 2019. *Report on the Economic Impact of Homicides*. Philadelphia: Philadelphia Office of the Controller.
- Shapiro, Robert J., and Kevin A. Hassett. 2012. *The Economic Benefits of Reducing Violent Crime: A Case Study of 8 American Cities*. Washington, DC: Center for American Progress.
- Tiry, Emily, Arielle Jackson, and Paige S. Thompson. 2022. "Economic Costs of Gun Violence in Washington, DC." Washington, DC: Urban Institute.
- Tita, George E., Tricia L. Petras, and Robert T. Greenbaum. 2006. "Crime and Residential Choice: A Neighborhood Level Analysis of the Impact of Crime on Housing Prices." *Journal of Quantitative Criminology* 22 (4): 299–317.

About the Authors

Emily Tiry is a senior research associate in the Justice Policy Center at the Urban Institute. Her research focuses on evaluations of programs and policies designed to help those impacted by the criminal legal system and the development and validation of risk assessment tools.

Arielle Jackson is a research assistant in the Justice Policy Center. Her research focuses on youth involved in the juvenile system, front-end system reform, and corrections.

Acknowledgments

This research was funded by Peace for DC. We are grateful to them and to all our funders, who make it possible for Urban to advance its mission.

The views expressed are those of the authors and should not be attributed to the Urban Institute, its trustees, or its funders. Funders do not determine research findings or the insights and recommendations of Urban experts. Further information on the Urban Institute’s funding principles is available at urban.org/fundingprinciples.

For more information on this project, see “Economic Costs of Gun Violence in Washington, DC” and “Educational Costs of Gun Violence: Implications for Washington, DC.”



500 L’Enfant Plaza SW
Washington, DC 20024

www.urban.org

ABOUT THE URBAN INSTITUTE

The nonprofit Urban Institute is a leading research organization dedicated to developing evidence-based insights that improve people’s lives and strengthen communities. For 50 years, Urban has been the trusted source for rigorous analysis of complex social and economic issues; strategic advice to policymakers, philanthropists, and practitioners; and new, promising ideas that expand opportunities for all. Our work inspires effective decisions that advance fairness and enhance the well-being of people and places.

Copyright © July 2022. Urban Institute. Permission is granted for reproduction of this file, with attribution to the Urban Institute.