



# Report on the Economic Impact of Homicides



**City Controller  
Rebecca Rynhart**

# Contents

<b>Executive Summary</b>	<b>ii</b>
<b>1 Introduction</b>	<b>1</b>
<b>2 Gun Violence in Philadelphia</b>	<b>3</b>
<b>3 The Impact of Homicide on Philadelphia's Property Values</b>	<b>6</b>
<b>4 Secondary Benefits from Reducing Gun Violence</b>	<b>12</b>
<b>5 Evidence-Based Strategies for Reducing Gun Violence</b>	<b>13</b>
<b>A Detailed Methodology</b>	<b>17</b>

## *Acknowledgments*

The Office of the City Controller would like to thank Anthony Smith of Cities United, Dr. Ken Steif of the University of Pennsylvania, Dr. Caterina Roman of Temple University, and Dr. John Roman of NORC at the University of Chicago for their review and comments during the preparation of this work.

# Executive Summary

As the financial watchdog for the City of Philadelphia, the Office of the City Controller works to ensure the efficient and effective operation of the city government. In that capacity, the office evaluates issues that impact the City's finances, its ability to provide services to residents and possible policy solutions. As part of that goal, the Controller's Office studied the rise in homicides in Philadelphia. In 2018, Philadelphia had the highest homicide rate per capita of the top ten largest cities with 351 murders – the most homicides in more than a decade. As of today, Philadelphia is on track to match or surpass last year's recent high. Rather than looking at the devastating human cost and community trauma implications of a homicide, which is difficult to quantify, the Controller's Office analysis focused on the impact of homicides on property values and the potential increase in tax revenue from reducing homicides. The report uses the potential economic benefit as a leverage point to consider alternate or more concerted investment in proven violence reduction strategies.

When discussing homicides, it is important to note that the vast majority of homicides involve a firearm and gun violence does not affect all populations or communities equally in Philadelphia. The population most affected by this violence is young, black or African American men. Gun violence is deeply complicated and the impact of social and economic disinvestment, along with intergenerational structural racism including residential segregation, cannot be understated.

## The Impact of Homicides on Property Values

This study analyzed all homicides (4,121) and more than 220,000 residential property sales that occurred between 2006 and 2018. It identifies sales in the immediate vicinity of a homicide, comparing the prices just before and just after the homicide to similar price changes for homes that are farther away, unaffected by the homicide. The results of the study show that homicides have a sizable effect on residential property sale prices.

- On average, sales that occur closer to a homicide tend to have lower prices than sales that occur farther from a homicide. Our results indicate that a single homicide lowers sale prices by 2.3 percent in the immediate neighborhood (within 0.75 miles of the homicide). Therefore, a reduction of one homicide would lead to a corresponding 2.3 percent increase of sale prices in the immediate neighborhood.

- A single year reduction of homicides by 10 percent translates to about a \$13 million increase in property tax revenue. Reducing homicides by 10 percent annually for five years translates to a total increase of \$114 million in property tax revenue, including \$43 million in year five alone.

With any meaningful reduction in gun violence, the City would likely experience a number of secondary economic benefits, in addition to increasing property tax revenue. Research shows that reducing gun violence could positively impact business disinvestment, job loss and depopulation in the most disadvantaged neighborhoods in the city.

## Investment in Violence Reduction Solutions

While Philadelphia's homicide rate has increased by 41 percent since 2013, other major cities have seen their homicide rates decrease in recent years. Violence reduction efforts in other cities show that relatively small amounts of funding, if invested in and implemented correctly, can lead to large reductions in homicide rates. Considerable evidence shows that strategies like Cure Violence, Group Violence Intervention and cognitive behavioral therapy are successful. The Oakland plan, for example, has been credited with a 32 percent decrease in gun homicides in the five years after its implementation in 2012. Oakland saw its homicide rate, overall, drop by nearly 50 percent over the same time period.

Research suggests that if the City invested \$30,000 per homicide in these proven violence reduction strategies, homicides could decrease by 10 percent annually. Using this research and Philadelphia's 2018 homicide total, the Controller's Office determined that Philadelphia could reduce homicides by 35 percent with a \$43 million investment over a five year period. This decrease in homicides would translate into a more than \$70 million return on investment, increased property tax revenue minus program costs.

Ultimately, meaningful progress to reduce gun violence and homicides will require short- and long-term solutions that address the violence itself, as well as the underlying structural and historical issues that lead to it. It will also need a coordinated and well-funded partnership between the mayor, community stakeholders, the district attorney, the police department, and the courts, with due consideration given to the victims of this violence and their families. The work in this report was conducted to help further necessary conversations to ensure meaningful progress can occur.

# Introduction

# 1

Philadelphia is in the midst of a crisis. With 351 murders, Philadelphia had the highest homicide rate per capita of the ten largest cities in the nation in 2018.<sup>1</sup> The homicide count has increased by 41 percent since 2013, reaching an 11-year peak last year. This stands in stark contrast to other major cities, like Los Angeles and New York, that have seen decreases in their homicide rates in recent years. While, Philadelphia is on target to match or surpass 2018's homicide total this year – the current year-to-date count is 275 murders, a five percent increase from the same time last year.<sup>2</sup>

As the financial watchdog for the City of Philadelphia (City), the Office of the City Controller works to ensure the efficient and effective operation of the City. This includes evaluating issues that impact the City's finances and its ability to provide services to its residents, as well as reviewing possible policy solutions to these issues. As part of that goal, the Controller's Office studied the recent rise in homicides. The human impact of a murder – the endless pain and loss suffered by the victims' family and the oppressive weight of trauma and fear felt in the neighborhoods affected by gun violence – is complicated and difficult to quantify due to the extremely sensitive nature of losing a loved one. As such, the Controller's Office focused this analysis on the broader economic consequences of gun violence, rather than gun violence's devastating human cost. These broader economic effects, like reduced property values, business disinvestment, and depopulation, in neighborhoods with high levels of violence prevent economic growth and reduce Philadelphia's tax base, impacting the city as a whole.

This report updates a 2012 study by the Center for American Progress<sup>3</sup> that examined the economic impact of reducing violent crime in eight cities, including Philadelphia. The study found significant potential benefits, ranging from lowered financial costs for victims and their families to savings for local governments from reduced criminal justice spending and higher tax revenues. It identified increased property tax revenue from rising housing values as the largest source of potential savings for municipalities. These savings are the focus of this report. Using historical data from 2006 through 2018, the report quantifies the effect of a single homicide on residential sale prices in Philadelphia and estimates the increase in the City's property tax revenue associated with reducing homicides by 10 percent. The report concludes with an overview of several strategies that have been successfully implemented in other major cities. Collectively, these examples demonstrate that relatively small amounts of funding, if invested correctly, can lead to large reductions in gun violence.

<sup>1</sup>Per the 2018 FBI Uniform Crime Reporting data.

<sup>2</sup>As reported on <https://www.phillypolice.com/crime-maps-stats/> as of October 14, 2019.

<sup>3</sup>Shapiro, R. and Hassett, K., *The Economic Benefits of Reducing Violent Crime: A Case Study of 8 American Cities*, Center for American Progress, June 2012.

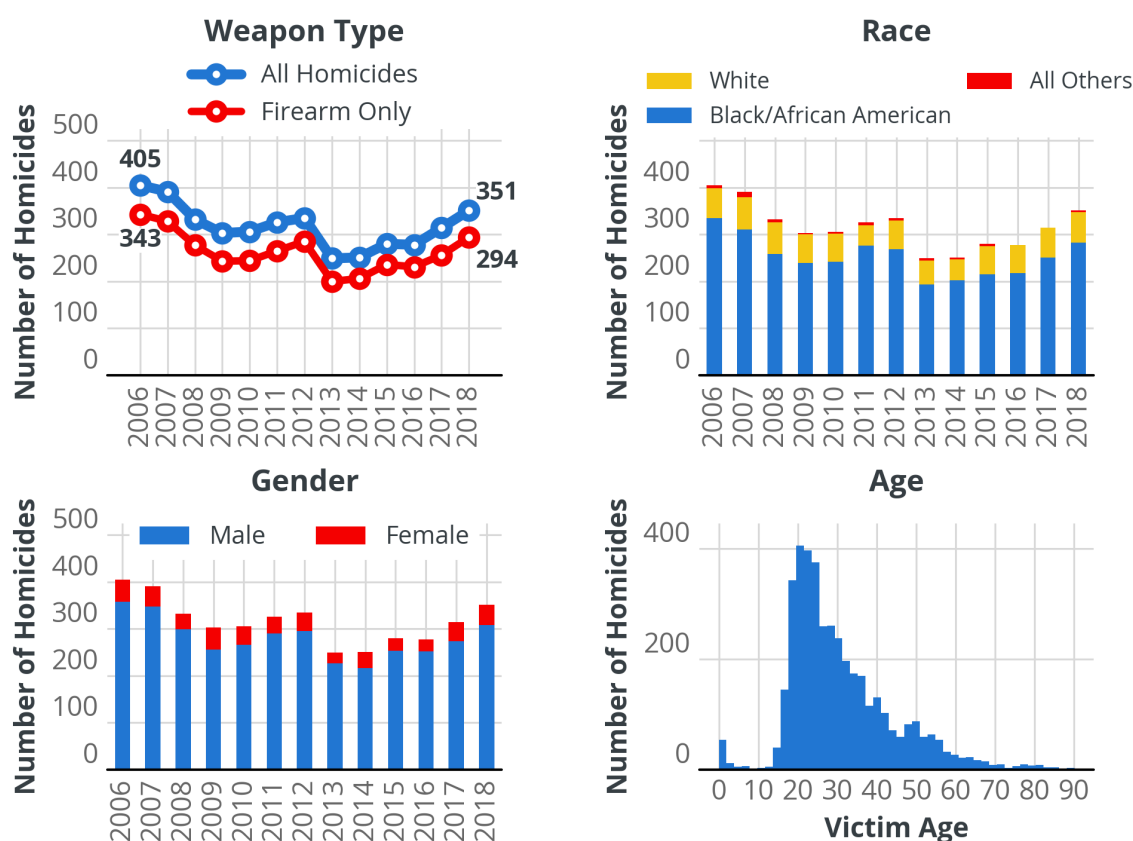
In January 2019, the Kenney Administration released its plan to combat the rising tide of gun violence. Many of the strategies outlined in the plan are longer-term and address deep-seated, interconnected problems to violence, like poverty and recidivism. This report does not assess the merits of that plan. Instead, it focuses on furthering the conversation on how to make meaningful progress toward reducing gun violence and homicides, and ultimately, saving the lives of Philadelphians. It seeks to use the potential budgetary savings and economic benefits that would accompany any reduction in gun violence in Philadelphia as a leverage point for considering alternate or more substantive investment in efforts to fight gun violence.

Ultimately, as the City of Philadelphia works to reduce gun violence and its' much too high murder rate, one fact remains clear – meaningful progress will require a coordinated and well-funded partnership between the mayor, community stakeholders, the district attorney, the police department, and the courts, with due consideration given to the victims of this violence and their families.

# Gun Violence in Philadelphia

Gun violence does not affect all populations and communities in Philadelphia equally. To better frame the discussion around economic costs, it is important to identify those populations and neighborhoods most affected by the issue of gun violence. Using homicide data since 2006, [Figure 1](#) below summarizes the major trends surrounding the issue of homicide in Philadelphia. The vast majority of all homicides, about 83 percent, involve a firearm, a trend that has remained stable since 2006. The population most affected by this violence is young, black or African American men between the ages of 18 and 35: they account for about half of all homicide victims since 2006. These racial disparities in homicides are well-known and are not unique to Philadelphia.<sup>1</sup>

**Figure 1**  
**Defining the Issue: Homicides in Philadelphia Since 2006**  
*Homicides are driven by firearm deaths & overwhelmingly affect black men between the ages of 18 & 35*



Source: Police Department

The observed racial disparities in homicide rates should be understood as largely the product of intergenerational structural forces that concentrate violence within certain

<sup>1</sup>Wintemute G., “The Epidemiology of Firearm Violence in the Twenty-First Century United States,” *Annual Review of Public Health*, 2015, 36:1, 5–19.

neighborhoods and categories of city residents. In particular, racial residential segregation, the hallmark of structural racism, is shown to be a key predictor of urban violence and homicide.<sup>2</sup> An analysis of state-level data spanning twenty-five years identified residential segregation as a primary driver behind the racial disparities in firearm homicide rates.<sup>3</sup> Similarly, a recent study focused on Philadelphia found that areas of the city that were racially segregated via the systematic denial of government-backed mortgages in the 1930s, a discriminatory process known as redlining, experience substantially higher present-day levels of firearm violence, nearly a century later.<sup>4</sup> Studies have also demonstrated that the isolation created by residential segregation creates barriers to economic mobility, limits educational and employment opportunities, and leads to racial disparities in a wide range of health outcomes.<sup>5</sup> This inequality of opportunity, created by structural racism, means that black or African American residents are not only at higher risk of homicide, but are also more likely to be living in neighborhoods that have experienced years of compounding economic and social disinvestment.<sup>6</sup>

In Philadelphia, one of the most racially segregated cities in the U.S.,<sup>7</sup> gun violence and homicides are concentrated in historically disadvantaged neighborhoods. These neighborhoods are primarily low-income with predominantly black or African American residents.<sup>8</sup> The level of disadvantage in these communities can be measured from Census-based indicators, including public assistance usage, poverty rate, the number of female-headed households, and the population under 18 years old.<sup>9</sup> As [Figure 2](#) shows below, the areas of the city with the highest levels of disadvantage (darkest blue) are primarily in North, West, and Southwest Philadelphia, and these are also the areas of the city that have experienced the most homicides.

The spatial overlap seen in [Figure 2](#) does not imply that poverty and disadvantage lead to higher homicide rates, or vice versa. In reality, the high levels of violence and poverty in these neighborhoods are intertwined in a complex cycle. In addition to the effects of residential segregation, there is substantial evidence that exposure to violence limits economic mobility, deepens poverty, and perpetuates further violence. The consequences

---

<sup>2</sup>Shihadeh, E., and Flynn, N., "Segregation and Crime: The Effect of Black Social Isolation on the Rates of Urban Violence," *Social Forces*, 1996, 74:4, 1325-1252.

<sup>3</sup>Knopov, A. et al., "The Role of Racial Residential Segregation in Black-White Disparities in Firearm Homicide at the State Level in the United States, 1991-2015," *Journal of the National Medical Association*, 2019, 111:1, 62-75.

<sup>4</sup>Jacoby, S. et al., "The Enduring Impact of Historical and Structural Racism on Urban Violence in Philadelphia," *Social Science & Medicine*, 2018, 199, 87-95.

<sup>5</sup>Williams, D., and Collins, C., "Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health," *Public Health Reports*, 2001, 116:5, 404-416; Sampson, J. and Winter, A., "The Racial Ecology of Lead Poisoning: Toxic Inequality in Chicago Neighborhoods, 1995-2013," *DuBois Review: Social Science Research on Race*, 2016, 13:2; Crowder, K. and Krysan, M., "Moving Beyond the Big Three: A Call for New Approaches to Studying Racial Residential Segregation," *City & Community*, 2016, 15:1, 18-22.

<sup>6</sup>Massey, D., "Apartheid: Segregation and the Making of the Underclass," *American Journal of Sociology*, 1990, 96:2, 329-357.

<sup>7</sup>Frey, W. and Myers, D., *Neighborhood Segregation in Single Race and Multirace America: A Census 2000 Study of Cities and Metropolitan Areas*, 2002.

<sup>8</sup>Beard, J. et al., "Quantifying Disparities in Urban Firearm Violence by Race and Place in Philadelphia, Pennsylvania: A Cartographic Study," *American Journal of Public Health*, 2017, 107:3, 371-373.

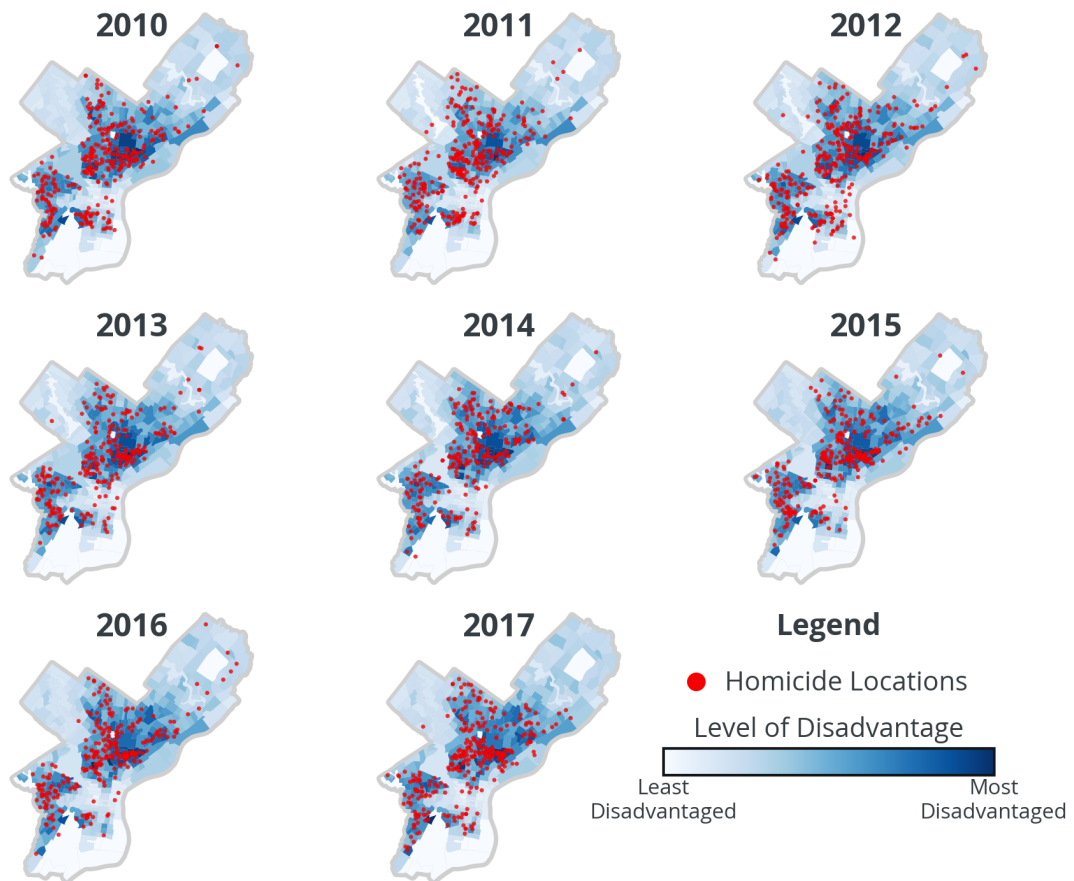
<sup>9</sup>Sampson R., Raudenbush S., and Earls F., "Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy," *Science*, 1997, 277:5328, 918-924.



of this cycle are intergenerational, impacting neighborhoods for decades. The persistence of these challenges can be seen in [Figure 2](#), which shows that the correlation between disadvantage and homicide has remained largely unchanged since 2010.

**Figure 2**  
**The Historical Correlation between Disadvantage and Homicides in Philadelphia**

*Homicides are most likely to occur in the most disadvantaged areas of the city*



**Notes:** The level of disadvantage is calculated from public assistance rates, poverty rates, female-headed households, and population under 18 years old  
**Sources:** American Community Survey 5-Year estimates, Police Department

# The Impact of Homicide on Philadelphia's Property Values

Across a wide sample of cities and time periods, residential property values have been shown to decrease as violent crime and homicide rates increase. Likewise, as violent crime rates fall, property values increase, as was the case following the dramatic reduction in violent crime across the nation in the 1990s.<sup>1</sup> More recently, surges in gun violence have been associated with slowing appreciation of home values in major U.S. cities,<sup>2</sup> and the detrimental effects were found to be strongest for properties in low-income neighborhoods.<sup>3</sup> A 2012 Center for American Progress (CAP) study analyzed housing and crime data from five cities, including Philadelphia, covering a time period from 2000 to 2011. The researchers found that a single homicide resulted in a 1.52 percent decrease in property values in the same ZIP code the following year, on average across the five cities.<sup>4</sup>

The CAP study clearly demonstrated the potential impact on a city's housing stock from a reduction in homicides. This section updates the CAP study using more recent data from 2006 to 2018 from the Philadelphia Police Department and the Office of Property Assessment to examine the relationship between homicides and residential sale prices. When a homicide occurs, it negatively impacts the perception of safety in a neighborhood. This perception affects sale prices by lowering the amount a home buyer is willing to pay for housing. This is primarily a local phenomenon, affecting sales within the neighborhood where the homicide occurs most strongly. The goal of this section is to estimate this local effect of homicides on nearby sale prices in Philadelphia.

As discussed in the previous section, homicides in Philadelphia are strongly clustered in the most disadvantaged neighborhoods of the city in North, West, and Southwest Philadelphia. Unsurprisingly, these are also the areas of the city where the median residential sale price is the lowest. This trend is highlighted using 2018 data in [Figure 3](#) below, which compares the number of homicides per neighborhood (left panel) with the median residential sale price (right panel). About half of all homicides in 2018 occurred in just 15 neighborhoods; these neighborhoods had a median sale price of \$55,000, well below the citywide median of \$155,000.

---

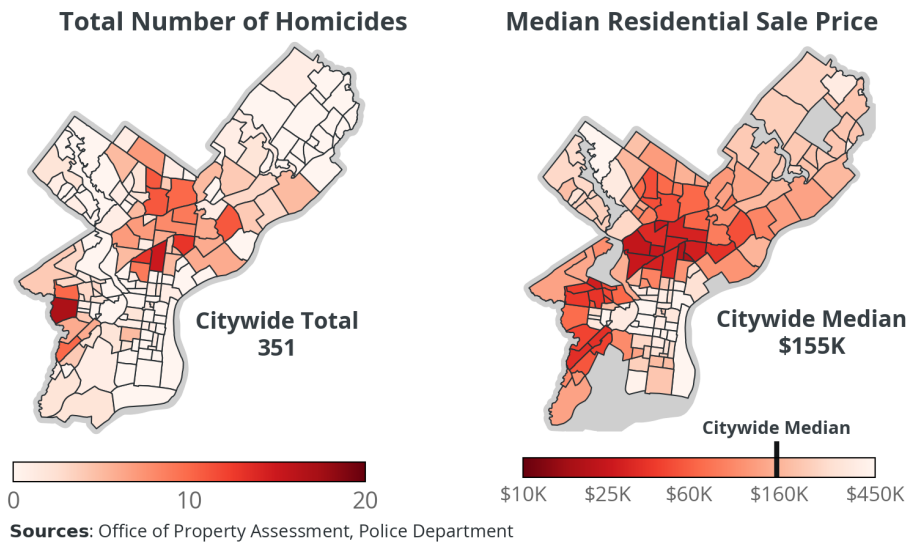
<sup>1</sup>Pope, D. and Pope, J., "Crime and Property Values: Evidence from the 1990s Crime Drop," *Regional Science and Urban Economics*, 2012, 42:1-2, 177-188; Schwartz A. et al., "Has Falling Crime Driven New York City's Real Estate Boom?" *Journal of Housing Research*, 2003, 14:1, 101-135.

<sup>2</sup>Irvin-Erickson, Y. et al., *A Neighborhood-Level Analysis of the Economic Impact of Gun Violence*, Urban Institute, June 2017.

<sup>3</sup>Tita, Petras, and Greenbaum, "Crime and Residential Choice: A Neighborhood Level Analysis of the Impact of Crime on Housing Prices," *Journal of Quantitative Criminology*, 2006, 22, 299-317.

<sup>4</sup>Shapiro and Hassett, *The Economic Benefits of Reducing Violent Crime*.

**Figure 3**  
**Median Sale Price & Homicide Totals across Philadelphia in 2018**  
*Areas of the city with the most homicides also have the lowest median sale prices*

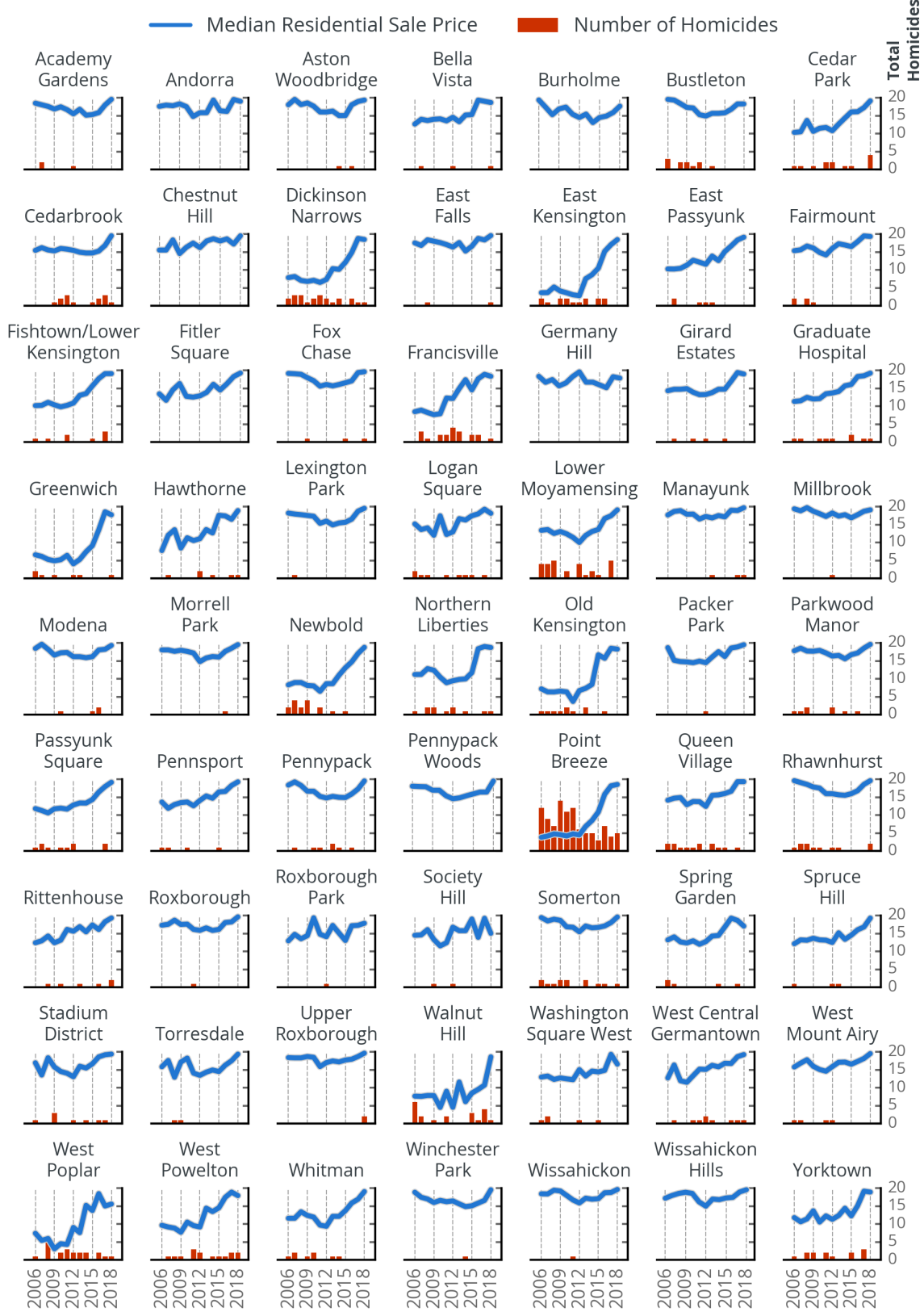


The historical relationship between sale price and homicides is shown for each of Philadelphia’s neighborhoods in Figures 4A and 4B on the next two pages. Figure 4A shows the relationship for neighborhoods with more expensive housing markets, as of 2018, while Figure 4B includes those neighborhoods with less expensive markets.<sup>5</sup> The varying effect of the Great Recession across Philadelphia’s neighborhoods is apparent. The sale prices in many neighborhoods, particularly those with prices below the median in 2018 (Figure 4B), show a distinctive “U” shape, indicating a steep decline following the Great Recession and a subsequent recovery in recent years. For some neighborhoods, particularly those presented in Figure 4A, housing values were largely unaffected by the Great Recession and only increased over the period studied.

Figures 4A and 4B illustrate the care that must be taken when studying the relationship between homicides and sale prices. In some neighborhoods, such as Point Breeze, homicides have declined over time and housing prices have increased considerably. While in others, such as Cobbs Creek and Stanton, both sale prices and homicides have seen an uptick recently. The number of homicides in a neighborhood is clearly not the only factor affecting sale prices. While sale prices depend on the characteristics of the property being sold, there are also important neighborhood-based market forces. For example, identical properties will sell for different prices if one is located in a more desirable area of the city. Over time, these housing sub-markets evolve in complex ways, affected by processes like gentrification and larger economic events such as the Great Recession.

<sup>5</sup>Specifically, Figure 4A includes neighborhoods with a median sale price above the citywide median in 2018, and Figure 4B includes neighborhoods with a median sale price below the 2018 citywide median.

**Figure 4A**  
**Trends in Residential Sale Prices & Total Homicides for Neighborhoods**  
**With Sale Prices Above the Citywide Median in 2018**



Sources: Office of Property Assessment, Police Department

**Figure 4B**  
**Trends in Residential Sale Prices & Total Homicides for Neighborhoods**  
**With Sale Prices Below the Citywide Median in 2018**

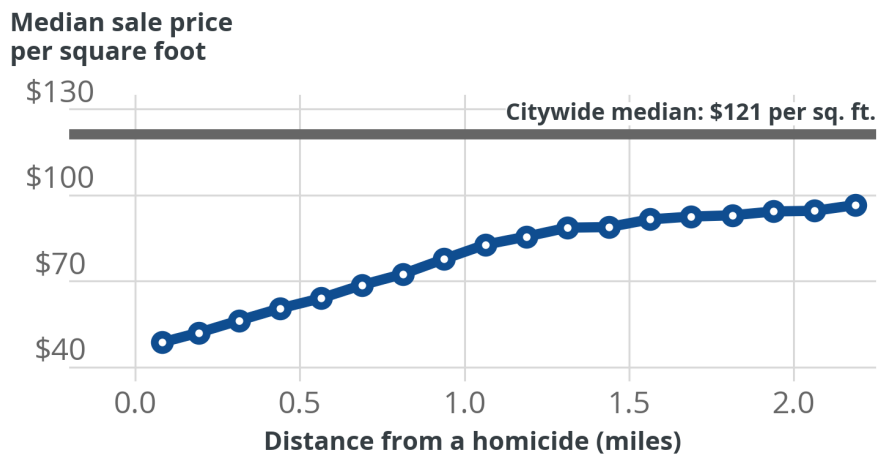


Sources: Office of Property Assessment, Police Department

A more granular modeling approach, extending beyond the neighborhood level, is necessary to properly measure the effect of homicides on sale prices. This report examines more than 220,000 individual sales and 4,000 homicides occurring between 2006 and 2018. For every homicide, the analysis compares the prices of nearby sales that occurred 60 days before and 60 days after the homicide, accounting for trends in sale price that may be specific to a particular neighborhood or year. These changes are then compared to price changes in areas that are slightly farther away and did not experience a homicide. By comparing to price changes in areas that did not experience a homicide, the analysis is able to isolate and estimate the effect of only homicides on nearby sale prices.

Sales that occur closer to a homicide tend to have lower prices, on average, when compared to sales that occur farther from a homicide. This trend can be seen in [Figure 5](#) below, which shows the median sale price as a function of distance from a homicide, averaged over all sales and homicides between 2006 and 2018. As expected, properties sell for less money when they are closer to a homicide location. The effect is strongest for sales in the immediate vicinity of a homicide (less than 0.1 miles), which had an average price of only \$50 per square foot, or about 40 percent of the citywide median price over this time period.

**Figure 5**  
**Residential Sale Prices Near the Locations of Homicides, 2006 to 2018**  
*Prices near homicides are significantly depressed relative to the citywide median price*



As illustrated in [Figure 5](#), homicides will most strongly impact the local housing market in the immediate neighborhood of the homicide location. Because of this relationship, our modeling analysis compares the sale price of properties located within 0.75 miles of a homicide to those sales that are slightly farther away, between 0.75 and 1.5 miles of a homicide. Using the typical size of a city block in Philadelphia,<sup>6</sup> these distances correspond to about 11 and 22 blocks, respectively. The smaller distance limit of 0.75 miles was selected based on the median size of a neighborhood in Philadelphia, using neighborhood boundaries from the real estate company Zillow. These neighborhood definitions provide a rough approximation of Philadelphia’s housing sub-markets. Properties within 0.75 miles

<sup>6</sup>A city block is about 360 feet long in Philadelphia on average.

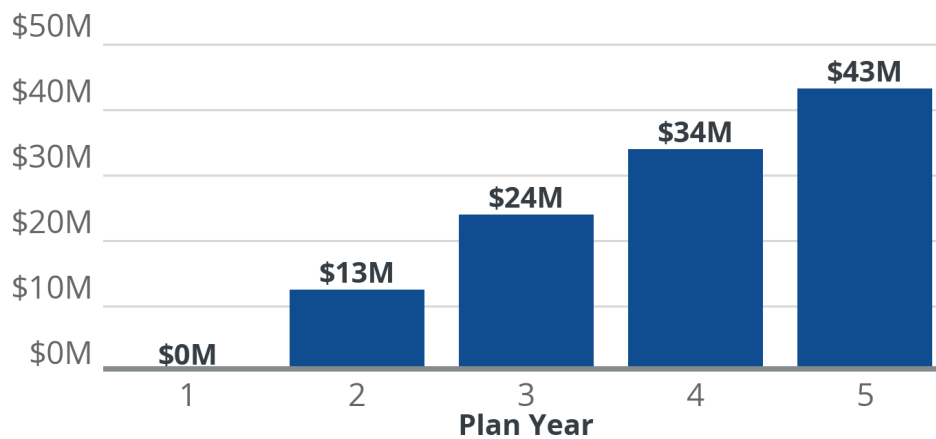
of a homicide will typically be within the same sub-market and will experience the largest price impact from the occurrence of a homicide.

Our modeling results<sup>7</sup> indicate that, on average, the occurrence of a single homicide is associated with about a 2.3 percent decrease in residential sale prices for properties within 0.75 miles of the homicide’s location, as compared to properties slightly farther away, between 0.75 and 1.5 miles of a homicide. This finding demonstrates that homicides have a sizable effect on sale prices in adjacent areas. Residential homes within 0.75 miles of a homicide sold for about \$150,000 on average during the period studied. Our results suggest homeowners who sold in the immediate aftermath of a homicide received a price about \$3,400 lower than they otherwise would have if the homicide not occurred.

These results show that sale prices are lowered by about 2.3 percent by the occurrence of a homicide. Therefore, a reduction of one homicide would be associated with a corresponding 2.3 percent increase in sale prices. To estimate the effect of a reduction in homicides across the city’s entire residential housing stock, we can use the City’s most recent property assessments and consider all residential properties within 0.75 miles of a homicide in 2018. Our findings indicate that a 10 percent reduction in homicides would increase the value of residential housing in the city by about \$950 million, leading to an increase in property tax revenue of about \$13 million.<sup>8</sup> If the number of homicides decreased by 10 percent annually for five years, the effect on housing prices would compound. As seen in [Figure 6](#) below, the resulting increase to the City’s property tax revenue would total \$114 million over five years and would generate \$43 million in year five alone.

**Figure 6**  
**Potential Added Property Tax Revenue from a Plan that Reduces Homicides by 10 Percent Annually for Five Years**

*The plan has the potential to add a total of \$114M over five years*



**Notes:** Revenue estimates compound annually, assuming a 2.3% increase in housing prices for every reduction in homicides.

<sup>7</sup>For a more technical description of the modeling methodology, see [Appendix A](#).

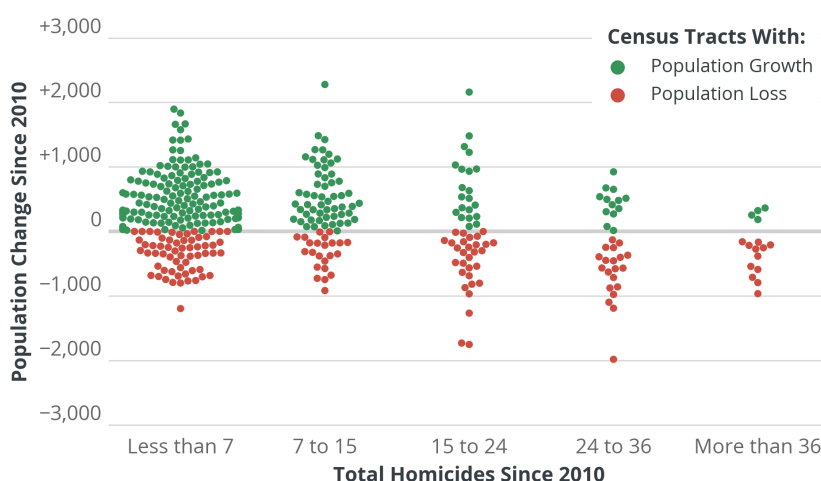
<sup>8</sup>This calculation assumes a property tax rate of 1.3998% and that property assessments are an accurate reflection of the value of the housing stock in the city. It does not account for the property tax collection rate or protections for low-income homeowners.

## Secondary Benefits from Reducing Gun Violence

The potential revenue gains described in the previous section likely underestimate the economic benefits for the City of Philadelphia from a decrease in gun violence because they do not include a number of secondary effects. Studies have shown that gun violence has a substantial effect on local economies by reducing job growth and business investment in the neighborhoods where violence is most prevalent.<sup>1</sup> High homicide rates also trigger depopulation at the neighborhood level, which, in turn, reduces a city's tax base and tax revenues.

The effect of high homicide rates can be seen in the historical population data for Philadelphia. Between 2010 and 2017, Philadelphia experienced both economic and population growth. Specifically, over this period the city's overall population increased by about 4 percent. However, census tracts<sup>2</sup> with the highest homicide rates were not part of this growth. Figure 7 below shows that census tracts that experienced more homicides since 2010 were also more likely to see their populations decline over that same time period. Only a handful of census tracts, about 4 percent of the total, had more than 36 homicides since 2010, an indication of the clustered nature of violence in the city. For these few, especially violent areas, three-quarters saw their populations decline from 2010 to 2017. For comparison, only about a third of the tracts with the lowest levels of violence (less than 7 homicides) experienced a population decline over the same period.

**Figure 7**  
**Population Change and Number of Homicides since 2010 by Census Tract**  
*Areas that experienced the most homicides were more likely to have seen a population decline*



Sources: American Community Survey 5-Year estimates, Police Department

<sup>1</sup>Irvin-Erickson, Y. et al., *The Effect of Gun Violence on Local Economies*, Urban Institute, November 2016; Irvin-Erickson, Y. et al., *A Neighborhood-Level Analysis of the Economic Impact of Gun Violence*.

<sup>2</sup>Census tracts are small geographic regions used by the US Census to aggregate results. There are about 380 census tracts in Philadelphia.



# Evidence-Based Strategies for Reducing Gun Violence

Recently, a number of cities have seen dramatic reductions in their homicide rate after beginning comprehensive, multidimensional violence-reduction plans. The lessons from these efforts demonstrate that these plans must be well-funded and carefully implemented, but if achieved, countless lives can be saved.

Violence-reduction strategies work best when they are focused on the individuals most at-risk of violence, both as perpetrators and victims. According to a recent review of more than thirty strategies, one of the leading evidence-based violence-reduction strategies is Group Violence Intervention (GVI), also commonly known as Group Violence Reduction Strategy or focused deterrence.<sup>1</sup> The approach targets the small group of people typically responsible for the majority of violence in a city, combining “hot spot” policing and clear communication about potential punishment with efforts by community organizers and social service providers to produce a fair and balanced approach to reduce violence. Successful implementation requires a coordinated effort from the relevant stakeholders, including the mayor, community leaders, the district attorney, police department, and the court system.

After its original implementation in Boston in 1995, GVI was credited with reducing youth homicide by 63 percent over a two-year period.<sup>2</sup> Since then, the strategy has been replicated successfully in numerous cities. A 2018 evaluation of GVI interventions in twenty-four cities found that, on average, the strategy was associated with a moderate, statistically significant reduction in crime.<sup>3</sup> Recent interventions in Chicago, Oakland, New Orleans, and Cincinnati have all led to substantial reductions in gun violence.<sup>4</sup>

Research suggests that GVI efforts are most effective when combined with complementary, largely preventative strategies as part of a broader anti-violence plan. One such approach is cognitive behavioral therapy (CBT). These programs, which seek to improve decision making for high-risk individuals, have had success in changing behaviors and preventing future violence. In Chicago, students who participated in the well-known Becoming

<sup>1</sup>Abt, T. and Winship, C., *What Works in Reducing Community Violence: A Meta-Review and Field Study for the Northern Triangle*, Democracy International, 2016.

<sup>2</sup>Braga, A. et al., “Problem-Oriented Policing, Deterrence, and Youth Violence: An Evaluation of Boston’s Operation Ceasefire,” *Journal of Research in Crime and Delinquency*, 2001, 38:3, 195-225.

<sup>3</sup>Braga, A. et al., “Focused Deterrence Strategies and Crime Control: An Updated Systematic Review and Meta-Analysis of the Empirical Evidence,” *Criminology and Public Policy*, 2018, 17:1, 205-250.

<sup>4</sup>Papachristos, A. and Kirk, D., “Changing the Street Dynamic: Evaluating Chicago’s Group Violence Reduction Strategy,” *Criminology & Public Policy*, 2015, 14:3, 525-558; Braga, A. et al., *Oakland Ceasefire Impact Evaluation: Key Findings*, August 2018; Corsaro, N. & Engel, R., “Most Challenging of Contexts: Assessing the Impact of Focused Deterrence on Serious Violence in New Orleans,” *Criminology & Public Policy*, 2015, 14:3, 471-505; Engel, R. et al., “Reducing Gang Violence Using Focused Deterrence: Evaluating the Cincinnati Initiative to Reduce Violence (CIRV),” *Justice Quarterly*, 2013, 30:3, 403-439.

A Man program, which included group counseling sessions and after-school programs, were about 45 percent less likely to be arrested for a violent crime.<sup>5</sup> A comprehensive 2007 review of fifty-eight CBT interventions, ranging from the 1980s through 2004, found that the most effective programs were able to reduce offending rates by 50 percent.<sup>6</sup>

Another well-known and evidence-based strategy is the community-oriented street outreach program known as Cure Violence. This program adopts a public health approach to violence, aiming to work independently of law enforcement to prevent violence before it happens. It relies on trusted community activists, known as “violence interrupters,” to intervene in disputes that could lead to gun violence. It focuses on the highest risk individuals and tries to change violent behaviors, as well as community norms. It has been used successfully in the cities of Los Angeles, New York City, and Chicago, among others.<sup>7</sup>

The cities of New Orleans, Louisiana and Oakland, California have had remarkable success using the strategies discussed in this section to reduce violence. In 2011, New Orleans had the highest murder rate per capita of major U.S. cities, while Oakland’s rate ranked sixth overall.<sup>8</sup> In 2012, both cities implemented multi-faceted anti-violence plans that included aspects of GVI, Cure Violence, and CBT. The Oakland plan, known as Operation Ceasefire, has been credited with a 32 percent decline in gun homicides over five years.<sup>9</sup> Overall, the city’s homicide total dropped by nearly 50 percent over the same time period. An evaluation of the New Orleans plan, NOLA for Life, credited the intervention with a 17 percent reduction in homicides in the two years following its implementation.<sup>10</sup> By 2015, the city’s overall murder rate had decreased by 26 percent.<sup>11</sup>

In the past, Philadelphia also saw positive results from both GVI and Cure Violence. The City launched a GVI pilot in 2012 with a budget of \$130,000. In the two years following its start, the areas of the city using the strategy experienced a 35 percent decrease in shootings.<sup>12</sup> Around the same time, the City used a \$1.5 million federal grant to fund a Cure Violence implementation in North Philadelphia.<sup>13</sup> After two years, the intervention was

---

<sup>5</sup>Heller, S. et al., *Thinking, Fast and Slow? Some Field Experiments to Reduce Crime and Dropout in Chicago*, National Bureau of Economic Research, 2015.

<sup>6</sup>Lipsey, M. et al., “Effects of Cognitive-Behavioral Programs for Criminal Offenders: A Systematic Review,” *Campbell Systematic Reviews*, 2007, 3:6, 1-27.

<sup>7</sup>Brantingham, J. et al., *GRYD Intervention Incident Response & Gang Crime 2017 Evaluation Report*, City of Los Angeles, 2017; Delgado, S., et al., *The Effects of Cure Violence in the South Bronx and East New York, Brooklyn*, Research and Evaluation Center at John Jay College of Criminal Justice, City University of New York, October 2017; Skogan, W. et al., *Evaluation of CeaseFire-Chicago*, 2008.

<sup>8</sup>Per the FBI’s Uniform Crime Reporting database. Only cities with populations greater than 250,000 are included.

<sup>9</sup>Braga, A. et al., *Oakland Ceasefire Impact Evaluation: Key Findings*, August 2018.

<sup>10</sup>Corsaro, N., & Engel, R., “Most Challenging of Contexts: Assessing the Impact of Focused Deterrence on Serious Violence in New Orleans,” *Criminology & Public Policy*, 2015, 14:3, 471-505.

<sup>11</sup>*NOLA For Life: 2016 Progress Report*, City of New Orleans.

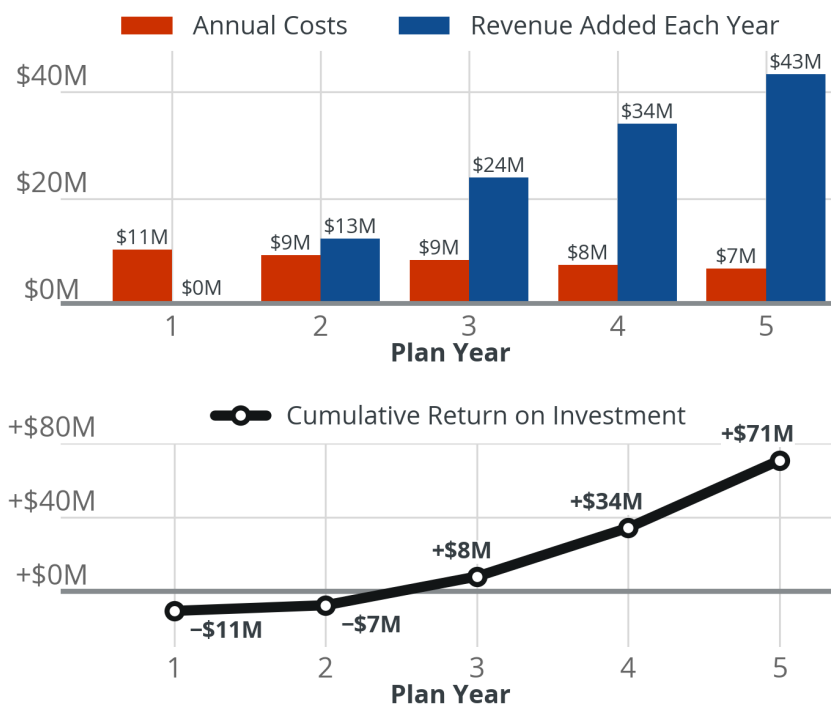
<sup>12</sup>Roman, C. et al., *Philadelphia Focused Deterrence: Findings from the Impact Evaluation*, Key Findings Research Brief, September 2017.

<sup>13</sup>From the Office of Juvenile Justice and Delinquency Prevention in the Department of Justice.

associated with a 30 percent reduction in nonfatal shootings.<sup>14</sup> Despite the clear successes of these programs, however, both have been phased out in recent years.

Today, there is a considerable amount of evidence, across a wide range of cities, that anti-violence programs like GVI, Cure Violence, and CBT are successful at reducing violence. In his recent analysis of urban gun violence, Harvard Kennedy School researcher Thomas Abt argues that cities should implement a combination of these initiatives to have the best chance to substantially reduce urban gun violence.<sup>15</sup> He estimates that if these strategies were funded with an annual level of \$30,000 per homicide<sup>16</sup> then cities could reduce the number of homicides by 10 percent each year. Based on Philadelphia’s 2018 homicide total, such a plan would cost about \$10.5 million in the first year and \$43 million over five years. While these amounts are not insignificant, the annual cost translates to only about 0.2 percent of Philadelphia’s most recent budget. When accounting for the increases to the value of the city’s housing stock, the plan would be a net positive for the City’s finances, resulting in a net gain of \$71 million over five years. This potential return on investment is highlighted in Figure 8 below.

**Figure 8**  
**Annual Costs and Added Property Tax Revenue from a Plan that Reduces Homicides by 10% Annually for Five Years**  
*Over five years, the return on investment would be \$71M*



**Notes:** Annual plan costs estimated to be \$30K per homicide per Thomas Abt’s *Bleeding Out*; Revenue estimate compounds annually, assuming a 2.3% increase in housing prices for every reduction in homicide.

<sup>14</sup>Roman, C., Klein, H., and Wolff, K., “Quasi-experimental designs for community-level-public health violence reduction interventions: a case study in the challenges of selecting the counterfactual,” *Journal of Experimental Criminology*, 2018, 14:2, 155-185.

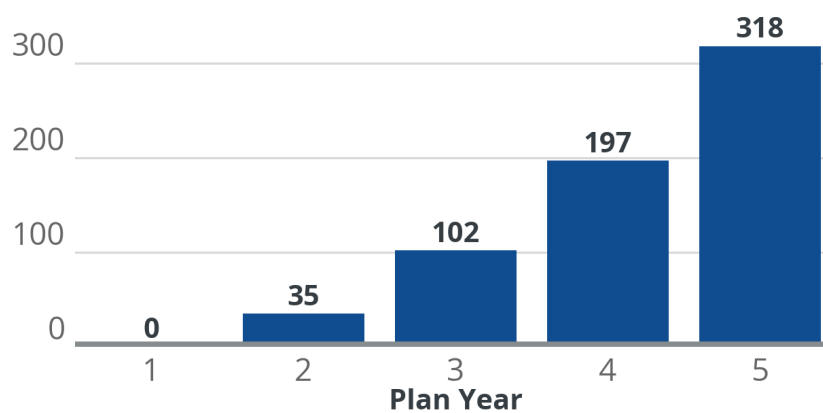
<sup>15</sup>Thomas Abt, *Bleeding Out*, 2019.

<sup>16</sup>The value of \$30,000 per homicide is based on Thomas Abt’s past professional experience in funding anti-violence initiatives.

Beyond the financial benefits tied to property values, investing in evidence-based strategies as part of a comprehensive anti-violence plan could have a truly stunning result for Philadelphia. A properly funded and implemented multipronged strategy could lead to a 35 percent reduction in homicides over five years, saving 318 lives. It would reduce the homicide count to 230, a historic low for Philadelphia. The impact of saving these lives on their loved ones and sparing their communities from the trauma of gun violence is immeasurable. Recreation centers would not have to close in fear of gun violence. Shops, restaurants, and other businesses would be able to thrive. New jobs and economic growth could start to lift Philadelphians out of poverty.

**Figure 9**  
**Cumulative Lives Saved from a Plan that Reduces Homicides by 10% Annually for Five Years**

*Over five years, the plan would save a total of 318 lives*



**Note:** The calculation compares to a baseline scenario where the homicide total remains at its 2018 level

Philadelphia has the opportunity to learn from other major cities that have seen dramatic reductions in violence in recent years. Meaningful progress on reducing violence can be made, but it will require an investment in proven strategies and short- and long-term solutions that address the violence itself, as well as the underlying structural and historical issues that lead to it. It will also need a coordinated and well-funded partnership between the mayor, community stakeholders, the district attorney, the police department, and the courts, with due consideration given to the victims of this violence and their families. The lives of Philadelphians are at stake.

# Detailed Methodology



This section provides a more detailed description of the methodology used to estimate the effect of homicides on local property values in Philadelphia. All of the software and data used in this analysis, as well as a tutorial describing the main results, have been released publicly.<sup>1</sup>

## Data Sources

The analysis relies on two datasets. The first, provided by the Philadelphia Police Department, includes data for 4,121 homicides that occurred in Philadelphia from 2006 to 2018. The dataset includes information on the location of each homicide, which enables our distance-based calculations in the estimation framework (see the next section).

The analysis also uses data for residential property sales that occurred in Philadelphia from 2006 to 2018 as provided by the Office of Property Assessment. The dataset includes sale information, such as date and price, as well as characteristics of the property being sold, such as its location, square footage, and exterior condition. Only residential sales are included in our primary analysis, and outlier sales have been excluded using the interquartile range of the log of the sale price. Sale prices have been adjusted to account for inflationary trends in housing values in the Philadelphia region during the period studied.<sup>2</sup>

The primary analysis only includes sales that occurred within 1.5 miles of a homicide. They are divided into two distance bins: those sales within 0.75 miles of a homicide and those between 0.75 and 1.5 miles of a homicide. The smaller distance limit was selected using the median size of Zillow-based neighborhoods in Philadelphia. The sales within this limit are the treatment group and will be used to estimate the size of the effect of homicides on sale prices. The price changes for properties in the treatment group are compared to the changes for sales between 0.75 and 1.5 miles of a homicide, which represent the control group in the analysis. Table A.1 below provides summary statistics for the sales data in each of these distance bins. This table indicates that sales that occur closer to the location of a homicide have lower sale prices and tend to be smaller in size, slightly older, and have a worse exterior condition.

---

<sup>1</sup>See <https://github.com/PhiladelphiaController/gun-violence>.

<sup>2</sup>Using the All-Transactions House Price Index for the Philadelphia MSA.

**Table A.1.**

<b>Distance to Any Homicide</b>	<b>Within 0.75 miles</b> Mean	<b>0.75 to 1.5 miles</b> Mean	<b>All Sales</b> Mean
Sale price (\$)	190,253	214,433	220,490
Square footage (sq. ft.)	1,296	1,311	1,334
Lot size (sq. ft.)	1,767	2,085	2,302
Sample size	284,902	360,004	423,590
Below Average Exterior Condition	9.13%	7.80%	6.82%
Built since 2000	7.15%	8.02%	7.88%

*Notes:* Summary statistics for all sales in our primary sample. Note that the same sale can contribute to multiple distance bins.

## Estimation Framework

The analysis relies on a hedonic pricing model with a difference-in-differences (DID) technique to estimate any causal effect of homicides on local property values. The major concern in this type of analysis is bias from omitted variables, such as an unknown and unaccounted for disamenity that negatively influences housing prices near homicides. To overcome these concerns, we use a spatial DID technique of the form:

$$\log(P_{ijt}) = \alpha_{jt} + \beta X_i + \pi_0 D_{ijt}^{0.75} + \pi_1 D_{ijt}^{0.75} * Post_{it} + \epsilon_{ijt}. \quad (\text{A.1})$$

The log of the sale price of property  $i$  is a function of a neighborhood  $j$  by year  $t$  fixed effect ( $\alpha_{jt}$ ), individual property characteristics ( $X_i$ ), and a random error term ( $\epsilon_{ijt}$ ). The indicator variable  $D_{ijt}^{0.75}$  has a value of one when the sale occurred within 0.75 miles of a homicide and a value of zero if it occurred between 0.75 and 1.5 miles of a homicide. The interaction variable  $Post_{it}$  indicates whether the sale occurred within the 60 days following a homicide. The key parameter in this framework is  $\pi_1$ , which provides an estimate of the causal effect of homicides on local sale prices for properties within 0.75 miles of a homicide.

This modeling framework is consistent with other studies that use spatial difference-in-differences to study housing prices.<sup>3</sup> The standard DID estimation framework in this analysis is complicated by the fact that homicides are spatially clustered and are not infrequent when compared to the frequency of sales. As such, the same sale can occur both within the 60 days preceding a homicide and the 60 days following a different homicide. The DID framework used in equation A.1 above does not account for this effect, and since these sales represent a relatively small fraction of the overall sample size, they are removed from the sample before performing the regression analysis.

By limiting the timeframe between sales and homicides to only 60 days, we hope to reduce the effects of long-term trends that might bias the regression results. Furthermore,

<sup>3</sup>See, for example: Linden and Rockoff, “Estimates of the Impact of Crime Risk on Property Values from Megan’s Laws,” 2008 or Pope and Pope, “When Walmart comes to town: Always low housing prices? Always?,” 2015.

the use of spatial fixed effects and the differencing technique also reduce biases from any potential omitted variables, particularly time-invariant trends. The window of 60 days was chosen by considering the frequency of sales and homicides in the dataset and by balancing the need to have enough observations in the analysis and the desire to limit the effects of long-term price trends.

## Estimation Results

The results of our primary regression analysis are presented in Table A.2 below. For illustrative purposes, we first present the results from a traditional, cross-sectional analysis rather than the full DID framework of equation A.1. The regression results in columns (1) and (2) only include a single spatial indicator variable to denote whether a sale is within 0.75 miles of a homicide. The results in column (1), which include sale-year fixed effects but no other control variables, confirm that the prices of sales that occur near homicides are significantly depressed, by about 31 percent, compared to those farther away. When adding in neighborhood fixed effects to control for neighborhood-specific trends, the impact weakens but is still substantial — sale prices are lower by about 9 percent within 0.75 miles of a homicide (see column (2)).

The primary results, presented in column (3) below, use the full DID framework given by equation A.1 to help mitigate any concerns regarding omitted variable bias in the analysis. The results suggest that sales that occurred within 0.75 miles of a homicide sold for about 2.3 percent less than sales slightly farther away, between 0.75 and 1.5 miles of a homicide. The analysis, using standard errors clustered at the neighborhood level, indicates that the result for sales within 0.75 miles is significant at the 1 percent level.

**Table A.2.**

Sale years included	2006 to 2018			2006 to 2011	2012 to 2018
	(1)	(2)	(3)	(4)	(5)
<b>Within 0.75 miles</b>					
<i>Coefficient</i>	-0.3088	-0.0857	-0.0478	-0.0407	-0.0344
<i>Standard Error</i>	0.0301	0.0175	0.0103	0.0177	0.0093
<i>P-value</i>	0.0000	0.0000	0.0000	0.0213	0.0002
<b>Within 0.75 miles * post</b>					
<i>Coefficient</i>			-0.0232	-0.0360	-0.0135
<i>Standard Error</i>			0.0094	0.0180	0.0060
<i>P-value</i>			0.0133	0.0460	0.0242
Housing characteristics	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓
Neighborhood fixed effects		✓	✓	✓	✓

*Notes:* Results presented for "Within 0.75 miles \* post" in column (3) represent the primary results. All analyses use a DID regression that includes sales that occur within 60 days of any homicide (both before/after) and use errors clustered at the neighborhood level.

As seen in Figures 4A and 4B, the overall trend in housing prices in many of Philadelphia’s neighborhoods following the Great Recession followed a “U” shape, reaching a low point around 2011. To test for any potential biases introduced into our primary analysis by this strong housing trend, we also present DID regression results for sales that occurred between 2006 and 2011 and between 2012 and 2018. As seen in columns (4) and (5) of the table above, the estimated impact of homicides on sales prices when using these sub-samples is consistent with the result obtained when using the full sample of sales.

The magnitude of the measured effect in this report is consistent with other published studies. A 2012 Center for American Progress Study found that on average across five cities, including Philadelphia, a single homicide resulted in a 1.52 percent decrease in property values in the same ZIP code the following year. Similarly, an analysis of census tracts in Oakland, San Francisco, Minneapolis, and Washington, DC found that surges in gun homicides lowered home values by about 4 percent from year to year. These studies all employ different analysis methods and cover a range of cities, making direct comparisons between them difficult. The analyses also measure the effect aggregated at different levels, such as at the neighborhood or census tract level. However, when considered collectively, the results suggest that homicides negatively impact housing prices, and the typical size of the effect is about 2 to 4 percent on average.

## Graphical Analysis and Falsification Tests

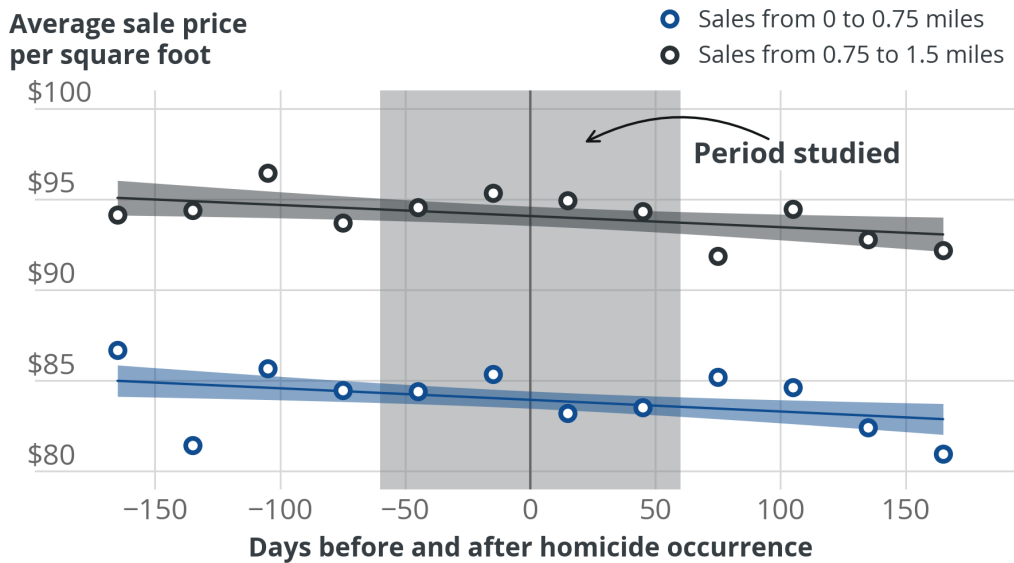
The key assumption underlying our DID analysis is the parallel trend assumption, which requires that the difference in housing prices between the treatment group (sales within 0.75 miles of a homicide) and the control group (sales between 0.75 and 1.5 miles of a homicide) are constant over time. To test this assumption, we examined the average sale price per square foot for the treatment and control groups, aggregated by the sale time measured in days before or after the homicide occurrence. These results are presented in Figure 10 below. As expected, the treatment group (blue) has lower overall prices per square foot than the control group (black). Furthermore, there appears to be no discernible difference in sale price trends between the treatment and control groups. As such, these results confirm the reasonableness of using sales between 0.75 and 1.5 miles of a homicide as the control group in our DID framework.



Figure 10

**Average Sale Prices Aggregated by Time Relative to Homicide Occurrence**

The two distance bins used in the analysis appear consistent with the parallel trend assumption



To further verify our primary results, we performed a series of falsification tests, which assigned false times to the homicide dataset. We repeated our primary regression analysis (as given in equation A.1) but instead used homicide times shifted 60 days and 180 days into the future and past. The results of these regressions are presented in Table A.3 below. Because the spatial locations of the homicides remain unchanged in the tests, there is still a strong negative impact on sale prices for sales within 0.75 miles (as indicated by the “within 0.75 miles” coefficient). However, the shift in homicide time breaks any causal connection and the coefficient of the interaction term should be consistent with no effect. Our tests confirm this expectation, as the measured coefficients for “within 0.75 miles \* post” for each of the tests is consistent with zero.

Table A.3.

Analysis type	Falsification tests using shifted homicide times			
	60 days earlier	60 days later	180 days earlier	180 days later
<b>Within 0.75 miles</b>				
<i>Coefficient</i>	-0.0618	-0.0538	-0.0501	-0.0487
<i>Standard Error</i>	0.0126	0.0132	0.0135	0.0159
<i>P-value</i>	0.0000	0.0000	0.0002	0.0021
<b>Within 0.75 miles * post</b>				
<i>Coefficient</i>	0.0181	0.0065	0.0085	-0.0022
<i>Standard Error</i>	0.0137	0.0064	0.0109	0.0140
<i>P-value</i>	0.1860	0.3050	0.4354	0.8737

Notes: All analyses use a DID regression that includes sales that occur within 60 days of any homicide (both before/after), neighborhood by year fixed effects, and errors clustered at the neighborhood level.

Finally, we performed further tests of our modeling analysis by repeating our primary regression analysis one hundred times, assigning randomly generated times to our homicide dataset for each iteration. This set of tests is similar to the previous tests using shifted homicide times, but the higher number of tests provides a greater chance to identify potential biases. Once again, the results of these tests were consistent with no effect, on average, and the distribution of results was consistent with the standard errors measured in the primary analysis. Only a single trial produced an effect comparable to the effect observed in the real data, indicating that there is about a 1 in 100 chance that the measured effect could be due entirely to random coincidence. This probability is consistent with the uncertainty suggested by our primary analysis.