Weapons of Mass Injustice

Visualizing the unequal impacts of gun violence
and the search for peace in America's cities

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Submitted in partial fulfillment of the requirements for the degree of Master Science in Data Visualization at Parsons School of Design // May 2020

Abstract

Over the past decade, gun violence has risen to the forefront of the American political and social agenda. Yet the story of American gun violence is focused on mass shootings that, despite being horrifyingly symbolic of the country's gun crisis, represent less than 1% of firearm deaths every year. Weapons of Mass Injustice is a visual essay highlighting forms of gun violence that often go overlooked. The project examines the unequal impacts of this violence and its connection to the criminalization of black and brown youth in the US. Using a scroll-based storytelling or "scrollytelling" approach, the project visually deconstructs federal firearm and criminal justice data that reveal not only the magnitude of the country's gun crisis but the deep racial inequities of daily gun violence and policing in the US. Readers are asked to question their beliefs about people at the center of daily gun violence and the collective action taken by law enforcement, city governments, and communities to bring about peace.

The full project can be visited at:

weaponsofmassinjustice.netlify.app

Acknowledgments

Deepest thank you to Daniel Sauter and Aaron Hill for your guidance and support.

Jason Corburn, Amanda Fukutome, and the Advance Peace team for your hard work towards humanizing gun violence reduction – without you this thesis would not be possible.

David Asari and Felix Buchholz, for your invaluable expertise and encouragement.

And to the class of 2020 Data Visualization cohort, I am continually inspired by you.

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Introduction

On the evening of July 12th, 2019, 23-year-old Darius Woods was killed by a stray bullet in Hagginwood Park, in Sacramento, CA. He was one of 28 people in Sacramento and one of roughly 15,000 Americans killed by gun homicide that year.[1,2]

Over the past decade, gun violence has risen to the forefront of the American political and social agenda. Media coverage and political discourse focus heavily on the increase in mass shootings in the US during this period, yet mass shootings account for less than 1% of American firearm deaths annually.[3] The remaining 99% are caused by pervasive, daily gun violence resembling the shooting that took Darius's life, and gun suicide, which alone accounts for nearly two-thirds of all gun deaths each year.

Gun violence is not only a public safety crisis, it is an equity issue reflective of structural racism and classism that unduly influences life expectancy in America. Patterns of gun violence follow the contours of racial segregation and income inequality in the US, concentrating in metropolitan areas, in neighborhoods like Hagginwood, where Black Americans are 10 times more likely to die from gun homicide than their white counterparts.[4] Young Americans, like Darius, are more likely to die from gun violence than be killed in a car accident.[5]

This gun violence crisis has led cities across the US to search for new evidence-based, community-informed solutions that reduce gun homicides and assaults.[6] Successful initiatives have found that focusing on small networks of known individuals involved in firearm activity is more effective than heavily policing entire neighborhoods. Relationships between city staff, youth, and community leaders, as well as law enforcement, have proven key to the success of strategies that provide meaningful alternatives to those most likely to shoot or be shot. And the results provide reasons for consideration – Richmond, CA, at its peak labeled as one of the most deadly cities in the US, saw gun homicides decrease by over 40% in the first year of adopting its gun violence reduction program.[7] In Chicago, IL, the Ceasefire program decreased shootings by 38% and killings by 29% in two neighborhoods with some of the city's highest gun violence rates.[8]

While evidence-based violence intervention strategies have proven effective at both reducing firearm activity and promoting healing, programs still face skepticism incited by media coverage negatively framing the allocation of city funds as soft on crime or as paying off criminals (by

[1] "Incident | Gun Violence Archive."
[2] "Number of Deaths in 2019 | Gun Violence Archive."
[3] "Ten Years of Mass Shootings in the United States."
[4] "Gun Violence Statistics."
[5] See 4
[6] Abt, *Bleeding out: The Devastating Consequences of Urban Violence-- and a Bold New Plan for Peace in the Streets*.
[7] Gonzales, "To Reduce Gun Violence, Potential Offenders Offered Support And Cash."
[8] Skogan et al., "Evaluation of CeaseFire-Chicago."

which individuals receive monetary compensation in exchange for laying down their guns). These misconceptions, while understandable in the context of long-established narratives about crime and punishment in the U.S., stand in the way of urgent work that if implemented in meaningful collaboration, can save thousands of lives.

Weapons of Mass Injustice is a visual exploration of gun violence and related intervention strategies that asks readers to question their beliefs about the perpetrators of gun violence and the collective action taken by city governments and communities to bring about peace. The project takes form as a scroll-based visual essay that unpacks federal mortality and criminal justice data to reveal connected injustices of America's gun violence crisis and its history of mass incarceration.

Though the visual essay reads as one continuous piece, the data narrative follows a three-part storytelling arc. The first offers an overview of gun violence and orients the reader to the scale and nature of annual gun deaths in the US. The second focuses on the history and byproducts of traditional urban gun violence reduction strategies, namely policing and other law enforcement tactics that have harmed American communities of color. The final data exploration provides an introduction to local gun violence intervention strategies working to promote peace and accountability without further contributing to systems of mass incarceration and racial inequity in the US.

In the aftermath of Darius Woods' death, his family voiced an important message to the local community – that from his killing "there was a lesson to be learned so that families don't feel the pain they feel".[9] This visual essay provides a multidimensional picture of gun violence in the US and highlights proven strategies to reduce it. While each of its three main data narratives may speak more directly to a specific audience, the project as a whole has relevance for policymakers and city governments, as well as activists and urban residents who care about safety and restorative non-violence practices in their communities.

Data & Methodology

Weapons of Mass Injustice focuses draws from three central datasets. The first two are from federal agencies, the Centers for Disease Control (CDC), and the Bureau of Justice Statistics (BJS), and the final was compiled for this project from a literature review of local gun violence intervention strategies across the US. The sources and data queries are detailed below. See **Table 1** for a full list of data sources for the project's visualizations.

[9] Khalil, "Family of Slain Man Echoes Community's Mission to Stop Gun Violence in Sacramento."

Table 1. Key visualization data sources

Source Title	Description / Citation	URL
Underlying Cause of Death, Firearm-Related, CDC Wonder, 2018.	Queries included all ICD-10 codes for external causes of death related to firearms. Data were disaggregated by state, age, race, and ethnicity	https://wonder.cdc.gov/ucd-icd10.html
Arrests for Weapons Offenses By Race Ethnicity, 1980-2014	Snyder, Howard N.; Cooper, Alexia D.; and Mulako-Wangota, Joseph. Bureau of Justice Statistics. Arrest in the United States, 1980-2014. Generated using the Arrest Data Analysis Tool at www.bjs.gov. April 18th, 2020.	https://www.bjs.gov/index.cfm?ty=datool&surl=/arrests/index.cfm
Jail incarceration rates at midyear, by race or ethnicity, 1990-2018	Bureau of Justice Statistics, Annual Survey of Jails, 1990-2004 and 2006-2018; and Census of Jail Inmates, 2005.	https://www.bjs.gov/index.cfm?ty=pbdetail&iid=6826
Imprisonment rate of sentenced state and federal prisoners per 100,000 U.S. residents, by sex, race, Hispanic origin, and age, 2016.	Includes data from the Bureau of Justice Statistics, National Prisoner Statistics Program, 2016; Federal Justice Statistics Program, 2016; National Corrections Reporting Program, 2015; Survey of Prison Inmates, 2016 (preliminary). Generated using the Corrections Statistical Analysis Tool at www.bjs.gov.	https://www.bjs.gov/index.cfm?ty=nps
Directory of Hospital Based Violence Intervention Programs	The Health Alliance for Violence Intervention (The Havi)	https://www.thehavi.org/directory-by-name
Directory of Cure Violence program sites	Cure Violence	https://cvg.org/where-we-work/
Group Violence Intervention sites	National Network for Safe Communities at John Jay College	https://nnscommunities.org/strategies/group-violence-intervention/
Homicide rates, fatal & non-fatal shootings	Richmond Police Department Homicide data	n/a
Homicide by firearm rate per 100,000 population in the United States from 2006 to 2018	Uniform Crime Reporting, FBI Compiled by Statista	https://www.statista.com/statistics/249805/homicide-by-firearm-rate-in-the-united-states/

Gun death rates

Gun death data from 2018 were obtained in CSV format using the CDC WONDER (Centers for Disease Control Wide-ranging Online Data for Epidemiologic Research) application. To obtain gun death counts and rates, the CDC Wonder Underlying Cause of Death database was queried using all ICD-10 (International Classification of Diseases, Tenth Revision) codes for firearm-related death for all states in 2018 by age, race, and ethnicity. Because differences in the impact of gun violence based on age were of interest, the project utilizes crude rates rather than age-adjusted rates. CSV files were compiled and converted into JSON format for final integration and implementation. CDC Wonder queries included the following codes for external causes of death:

Accidental:
- W32 (Handgun discharge);
- W33 (Rifle, shotgun and larger firearm discharge);
- W34 (Discharge from other and unspecified firearms);

Intentional self-harm:
- X72 (Intentional self-harm by handgun discharge);
- X73 (Intentional self-harm by rifle, shotgun and larger firearm discharge);
- X74 (Intentional self-harm by other and unspecified firearm discharge);

Assault:
- X93 (Assault by handgun discharge);
- X94 (Assault by rifle, shotgun and larger firearm discharge);
- X95 (Assault by other and unspecified firearm discharge);

Undetermined nature:
- Y22 (Handgun discharge, undetermined intent);
- Y23 (Rifle, shotgun and larger firearm discharge, undetermined intent);
- Y24 (Other and unspecified firearm discharge, undetermined intent)

For the choropleth map visualization, gun homicide rate data (cause of death due to firearm assault) was spatially joined with US states and territories data from the Census Bureau and exported in GeoJSON format using QGIS.

Criminal justice data

Criminal justice data visualized in Weapons of Mass Injustice draws from a range of Bureau of Justice Statistics (BJS) datasets including Arrests for Weapons Offenses By Race Ethnicity, 1980-2014; Jail incarceration rates at midyear, by race or ethnicity, 1990-2018; and Imprisonment rate of sentenced state and federal prisoners per 100,000 U.S. residents, by sex, race, Hispanic origin, and age, 2011-2016. Arrest data was generated using the Arrest Data Analysis Tool and Imprisonment rate data was generated using the Corrections Statistical Analysis Tool, both at www.bjs.gov. Data were accessed in CSV format, condensed using pivot tables in Microsoft Excel, and converted to JSON format.

Local intervention strategies

Data on local gun violence intervention strategies were manually compiled based on a literature review of US-based programs that fall into the following categories: Hospital Based Violence Intervention Programs (HVIPs), Cure Violence, Group Violence Intervention, and hybrid programs. The main sources include The Health Alliance for Violence Intervention (The Havi), Cure Violence, The National Network for Safe Communities at John Jay College, and Advance Peace. Here programs were aggregated by city, geocoded, and converted to GeoJSON format. This dataset, while representative of the myriad of local strategies adopted in cities across the US, is not intended to be a comprehensive directory and should not be considered exhaustive.

Libraries, Media, and Data Manipulation

Weapons of Mass Injustice was developed using Vue.js and Nuxt.js. The project is deployed using Netlify. The following additional libraries were used to create individual visualizations and components of the visual essay:

- Vue-Scrollama - scroll-based storytelling, visualizations are triggered as the user scrolls through each section of the narrative.
- GreenSock Animation Platform (GSAP) - SVG based animations of position, scale, and opacity are triggered by scrollama and implemented using GSAP
- Vue-Chart.js - line graphs for gun death rates, arrest trends, jail rates, and incarceration rates were implemented using vue-chart.js due to the library's built-in legend toggling and user interaction features.
- D3.js - the interactive map of gun homicide rates by state, and local intervention programs by city, was created using D3 and GeoJSON data described above.

Two videos are utilized in the opening section of the visual essay. The first draws from youtube footage of CitiField baseball stadium on opening day in 2015 by Matt Sabban. The second is an aerial video of the stadium generated using Google Earth Studio.

SVG based illustrations were created in Adobe Illustrator, and incorporate the following Noun Project icons:

- User - Lil Squid
- Balloon - Misirlou
- Photo frame - Musmellow
- Tulips - ANTON icon
- Tulips - Istuningrum
- Candle - Abdo
- Tribune Seat - Félix Péault
- Emblem - Blink@design
- Hospital - Bmijnlieff

Background & Visual Approach

The following sections provide background information on the visual essay's key data narratives and contextualize the project's data visualization and design decisions for each respective topic.

An overview of gun deaths in the US

Gun violence is an American health equity crisis

Gun violence is a uniquely American problem. In 2010, Americans were not only 25 times more likely to be killed by a gun than residents of any other high-income country, but the US gun homicide rate was 7 times higher than the second-ranking country, Canada, and 600 times higher than the lowest ranking country, Korea.[10] In 2016, 37,000 Americans were killed by a gun, making it the second-largest contributor of global firearm deaths after Brazil, which reported 43,200 deaths that year.[11]

Yet gun violence does not impact all Americans equally. In urban areas the disparity grows worse – residents living in the 50 US cities with the highest homicide rates are 5 times more likely to be killed by a firearm than the average American.[12] Young people are also particularly vulnerable; in 2010, 92% of the world's 15-24-year-old youth homicides occurred in the US, and in 2017, gun violence was the second leading cause of death for all children ages 0-17 and the leading cause for black children of the same age group.[13] The likelihood of being killed by a gun grows exponentially for young men of color and particularly for young black men, who experience a gun homicide rate 20 times the national average.[14]

Human and economic costs of gun violence

Though not all Americans are at equal risk of being shot, American taxpayers share an estimated $229 billion in gun violence costs annually – each gun homicide costing on average $448,000. This amounts to approximately $700 per taxpayer every year.[15] For the survivors of gun violence and their families, hospital bills, mental health services, physical rehabilitation, and loss of income can add up to a lifetime's worth of debt.

But the greatest cost of gun violence is the human cost, the loss of thousands of lives full of potential, and the trauma that loved ones experience in the aftermath of a shooting. Both individual acts of gun violence and cumulative daily gun violence can have ripple effects within a community and cause trauma across generations. Children who are exposed to violence in their home or community are robbed of time that should be spent dreaming and playing, and, as they

[10] Grinshteyn and Hemenway, "Violent Death Rates."
[11] "Six Countries in the Americas Account for Half of All Firearm Deaths."
[12] "Gun Violence in Cities."
[13] "WISQARS (Web-Based Injury Statistics Query and Reporting System)|Injury Center|CDC."
[14] "Proven Solutions to Urban Gun Violence."
[15] See 14

grow older, they are more likely to face challenges including substance abuse and mental illness, as well as educational setbacks and economic losses.[16]

Many people persevere in the face of traumatic experiences at all stages in their life, but not all have the support to reach their goals or return to a sense of normalcy after being subjected to gun violence. Individuals who are exposed to community violence often experience prolonged, elevated levels of stress that over time heighten sensitivity to perceived threats and cause them to live in a perpetual state of fear.[17]

In a study of 630 youth, half of those either directly or indirectly exposed to gun violence took actions including changing their routes to get places, limiting time spent alone, hiding, staying home from school, or carrying a gun.[18] While coping strategies can be a positive way to manage stress, these behavior changes have a disruptive effect on daily life and may cause long term damage to mental health. Toxic stress as a result of such repetitive trauma can permanently change the brain in ways that harm cognitive development, including impaired decision making, learning, and memory. [19]

Data Visualization and Design Decisions

The visual essay begins with an overview of the nearly 40,000 gun deaths in 2018 using aerial footage of a baseball stadium filled with points to give the reader a sense of scale. While the majority of the project focuses on the unequal impacts of gun homicide, this section intentionally starts with the full picture of gun deaths of all causes – homicide, suicide, and accidents/unknown – to both orient readers to the sheer volume of gun casualties in the US and to juxstapose the country's two largest gun crises, suicide and homicide, one of which is treated as a public health crisis and the other which is treated as a crisis of criminality. This juxtaposition builds a mental image for readers as they transition into the following section on criminal justice and mass incarceration in the US.

In communities most impacted by daily gun violence, residents live with the omnipresent threat of gun injury and death. Yet because daily gun violence is by nature a gradual accumulation of individual acts, those who do not personally experience this kind of violence may not be able to fully grasp its magnitude. The symbolic use of baseball, an American pastime, aims to capture the scale of this American tragedy. Readers view footage panning CitiField Stadium on opening day in 2015, imagery familiar to many who have attended or watched a game. By taking readers back to an experience they may have already had, or by illustrating, maybe for the first time, what being among 40,000 people looks like, the opening scene aims to evoke a relatable and sobering sense of the magnitude of gun mortality in the US.

After presenting the count of gun deaths by cause, the visual essay next pivots to walk readers through gun death rates that reveal stark inequities across age, race, and ethnicity. To keep visual

[16] Shonkoff et al., "The Lifelong Effects of Early Childhood Adversity and Toxic Stress."
[17] "The Relationship Between Community Violence and Trauma."
[18] Mitchell et al., "Understanding the Impact of Seeing Gun Violence and Hearing Gunshots in Public Places."
[19] Shonkoff et al., "The Lifelong Effects of Early Childhood Adversity and Toxic Stress."

continuity, the same baseball stadium is used to illustrate 100,000 people, the denominator most commonly used to calculate rates (e.g. annual gun deaths per 100,000 residents). Here a combination of animated illustration and interactive line graphs helps to distinguish rate indicators from total counts and to highlight the stark disparities between racial/ethnic groups in the US; in particular the exponentially higher gun homicide rate for young Black Americans.

Mass Incarceration and Racial Inequity

Problems with policing in the US

Traditional responses to urban gun violence have relied heavily on increased policing and surveillance of communities most impacted by gun violence. While these communities experience higher rates of policing, they do not reap the benefits of improved safety or justice.

The same young men who face the greatest likelihood of being killed by a firearm are also more likely to be killed by law enforcement. Recent findings suggest that Black men in their late 20s have a 1 in 1000 probability of being killed by police, a likelihood 2.5 times greater than that of their White counterparts.[20] Thus the systems and actors that are traditionally deployed as first responders to urban gun violence, the investigators of violent crime and representatives of the justice system, are more likely to use excessive force resulting in bodily harm or death within communities that need the most protection from daily violence to begin with.

Genuine fear of law enforcement and mistrust of police are drivers of underreporting violent crimes and cyclical group violence; with little faith in the criminal justice system and daily threats of lethal force, those impacted by gun violence are more likely to engage in retaliation or violent self-defense. And where law enforcement is involved, justice is too often never served. In a study conducted by the Washington Post on homicides in America's 52 largest cities, African Americans represented only a quarter of the cities' populations but nearly 70% of homicides. Yet while police failed to make an arrest in 37% of cases with White victims, they failed to make an arrest in 53% of cases with Black victims.[21]

Overpolicing is tied to the phenomenon of mass incarceration in the US, a phenomenon that, like urban gun violence, disproportionately disrupts the lives of Black and Latino men and the communities from which they come. The US has the highest rate of incarceration in the world, with 2.3 million people – 698 out of every 100,000 residents – in jail or prison.[22] In 2015, Black and Latino people together represented 34% of the American population but 56% of the incarcerated population.[23] Though recent data show that racial disparities in incarceration are declining, a reality in which 1 in 3 Black men and 1 in 6 Hispanic men is imprisoned continues to intensify hostile police-community relationships and cycles of retaliatory violence.[24]

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[20] Edwards, Lee, and Esposito, "Risk of Being Killed by Police Use of Force in the United States by Age, Race–Ethnicity, and Sex."
[21] "Unequal Justice."
[22] Sawyer and Wagner, "Mass Incarceration."
[23] "NAACP | Criminal Justice Fact Sheet."
[24] "Criminal Justice Facts."

Broad police tactics that criminalize and incarcerate people of color at inordinate rates are described by researchers as "crime control theater", or crime control strategies performed by law enforcement that aim to mollify public fears, whether real or perceived, yet lack evidence that supports their effectiveness at improving community safety.[25]

California's Three Strikes Law, one such strategy, is a crime control policy that mandates a life sentence without parole to any individual convicted of a felony if they have two prior serious or violent felony convictions. Despite Three Strikes being promoted as a way to deter criminals from violence, the law has resulted in a high rate of incarceration for nonviolent offenses. An analysis conducted in 2011 found that among major counties in California, the percentage of non-violent Three Strikes prisoners ranged from 25% to as high as 70%.[26] In analyses of the law's impacts on racial and ethnic groups in California, Black defendants were found to have nearly twice the odds of a Three Strikes sentence than their White counterparts.[27]

Another crime control program known as Stop and Frisk was expanded heavily in New York City during the early 2000s under then-mayor Michael Bloomberg, allowing officers to search and detain anyone they deemed suspicious on the street or in their homes. At its peak in 2011, Stop and Frisk resulted in over half a million random stops. That year, 87% of individuals stopped were Black or Latino. 88% of individuals stopped that year were innocent.[28]

Blanket policing tactics and tough on crime policies such as Stop and Frisk and Three Strikes treat entire communities as responsible for violence largely perpetrated by small groups of individuals. They contribute to harmful fabricated stereotypes based on race and class and heighten strained relationships and poor trust between communities and law enforcement.

Data Visualization and Design Decisions

The second data narrative in the visual essay focuses on these issues of mass incarceration and racial inequity in the criminal justice system. A question is posed for readers to consider as they engage with incarceration data: "why is addressing gun violence solely through law enforcement and the criminal justice system problematic?". This section begins by comparing US incarceration rates to countries on the high and low end of the incarceration rate spectrum using a bar graph made of individual points, each of which represents one incarcerated individual per 100,000 residents. Here Japan, Canada, and Brazil were chosen as comparison countries, with Japan representing the low end and Brazil the mid to high end of global incarceration rates.

As the reader scrolls, the bar chart zooms out to reveal the incarceration rate of White men, Black men, and Black men ages 30-39 in the US. This visualization also gives a sense of scale and context, highlighting the burden of incarceration that mirrors the disproportionate rate of gun homicide shouldered by young men of color. To further explore this point, the visual essay

[25] DeVault, Miller, and Griffin, "Crime Control Theater."
[26] Males, "Striking Out: California's 'Three Strikes And You're Out' Law Has Not Reduced Violent Crime."
[27] Chen, "The Liberation Hypothesis and Racial and Ethnic Disparities in the Application of California's Three Strikes Law."
[28] "Stop-and-Frisk Data."

introduces interactive line graphs depicting trends of arrests for weapons possession, jail rates, and overall incarceration rates by race/ethnicity dating back to the early 1990s. The section concludes by reiterating that this data has historically been used to justify race-based theories of crime and delinquency as well as crime control policing tactics that have harmed communities of color in the US. As readers transition to visualizations focused on local intervention strategies, they are faced with the question, can this same data be used instead to push back on systems of oppression?

Local Gun Violence Intervention Strategies

Asset framing and racism in the US: why language matters

When daily gun violence *is* covered by mainstream media, the most impacted neighborhoods are often portrayed as crime-infested, dangerous places with unstoppable forces of criminal activity and delinquency. The implicit messaging of race and crime talk legitimize the erasure of certain experiences of violence. Creating a new narrative around state and community responses to violence requires questioning the language used to discuss people, the images of them portrayed by the media, and their perceived individual and collective value to society.

The individuals at the center of urban gun violence are assets to the communities in which they live and work. They are people with personal and educational goals, parents, siblings, and significant others. For victims of mass shootings in the US, this is often reinforced in an outpouring of media coverage and messaging from public officials. For those facing the daily threat of gun violence, such humanity is obscured by the same media outlets and politicians who frame violence in poorer, blacker neighborhoods as an inevitable byproduct of their environment.

The language used to describe people and conditions in neighborhoods with high crime rates, disproportionately non-white neighborhoods, includes familiar coded compound words such as “at-risk”, “low-income”, “inner-city”, and less veiled terms like “thugs”, and “black-on-black crime”. Rhetoric either alluding or pointing directly to skin color as a proxy explanation for crime goes beyond ignorance or lack of representation in media or public office. The use of symbolic racial language and normalization of urban violence reinforce narratives about black criminality that have justified the exploitation and abuse of black bodies since slavery.[29]

At best, these terms are objectionably used to point out disadvantage. At worst, they are deliberate characterizations used to dehumanize their subjects. In either case, code phrases perpetuate racist stereotypes despite the user’s intention. They are the same characterizations that justify mass incarceration and legitimize excessive use of force used by police in their interactions with young men of color in the US.

Inequities in media coverage and rhetoric used to discuss gun violence extend to the framing and excessive questioning of all black victims of violence. In a comparison of the shooting of unarmed black 17-year-old Trayvon Martin who was followed and killed in Sanford, Florida in

[29] Dowler, “Dual Realities?”

2012 and the mass shooting of 17 high school students in Parkland, Florida in 2018, researchers highlighted that Martin's murder was portrayed as "a tragedy of race rather than a tragedy of gun violence"... "In contrast, the Parkland shooting—like mass shootings more generally—was framed as an attack on "normal kids" doing "normal things" and, as such, an attack on white, middle-class American life".[30]

The difference in the framing of mass shootings and daily gun violence has shaped a racialized and politicized discourse around strategies to reduce this violence. How the victims and perpetrators of gun violence are portrayed in analyses of shootings influences if, where, and what solutions are implemented. Thus it is not merely the discourse itself but rather the action or inaction of policymakers and the private interests the discourse supports that prevent meaningful action to reduce gun violence. The following section discusses urban gun violence reduction work that seeks to counter status quo narratives of criminality by upholding the notion that those at the center of urban gun violence are assets rather than liabilities.

Community-based local violence intervention

Addressing racial and socioeconomic injustices of gun violence and promoting effective violence reduction work requires more than just changing language. Contrary to policing tactics that treat entire communities as responsible for high crime rates, recent research shows that the perpetrators of gun violence often represent less than 1% of a city's population. In the city of Richmond, CA, 28 individuals, or less than 0.001% of the population, were found responsible for approximately 70% of gun crimes[31]. These individuals are often tied to street groups, connected networks of individuals who are most likely to shoot or be shot.[32]

Community leaders, local governments, and residents have responded by leading a wave of successful violence interruption strategies that focus on a small number of individuals and de-escalating conflicts likely to lead to violence. Several evidence-based approaches have shown promising results in cities across the US including Group Violence Intervention (GVI), Cure Violence, Hospital-Based Violence Intervention Programs (HVIPs), and hybrid programs that combine multiple facets of these strategies.[33]

The common thread amongst these programs is a core belief that those at the center of violence are deserving of love and support. Programs may have varying relationships with law enforcement ranging from direct partnership to complete separation of work, yet all reject policing as the sole or primary response to community violence. Instead, these strategies rely heavily on messaging from community members or individuals formerly involved in firearm activity to deescalate cyclical retaliatory gun violence and provide healthy alternatives.

The Cure Violence model employs street outreach workers or "violence interrupters" who have intimate knowledge of cyclical violence and can mediate street conflicts. This model treats

[30] Armstrong and Carlson, "Speaking of Trauma."
[31] August 2019, "Breaking the Cycle."
[32] See 14
[33] "The Impact of Local Violence Intervention Programs."

violence like a communicable disease that will spread across communities if left untreated. Gun violence is considered contagious, and stopping one act of violence means not only saving lives but decreasing the likelihood that violence will be repeated. In five hotspot areas of gun violence in the city of Philadelphia, the Cure Violence model was associated with a 34% reduction in the rate of shootings after implementation in 2011.[34]

Whereas Cure Violence focuses more on conflict mediation, the Group Violence Intervention (GVI) strategy employs a "focused-deterrence" tactic that incentivizes non-violence while continuing to take punitive action against individuals who perpetrate violence. GVI programs generally begin with a call-in meeting hosted by community leaders who ask for an end to the violence and offer resources and counseling to individuals caught in cycles of retaliation. In this call-in, both community and law enforcement also send a warning that if the violence does not stop, action will be taken against those involved. Evaluation of the Chicago Group Violence Reduction Program found that street group members who attended call-ins were 23% less likely to engage in gun violence in the year following.[35]

Hospital-Based Violence Intervention Programs (HVIPs) have also proven successful in lowering rates of gun violence for survivors of violent crime, and are often implemented in partnership with other gun violence reduction programs. By providing resources, counseling, and support after an individual has been hospitalized, these programs help prevent retaliation and reduce the likelihood of reinjury or death. Patients engaged in HVIPs have shown measurable decreases in hospital recidivism and violent crime arrests, as well as increases in employment.[36]

More recently, hybrid models that use a combination of community and local government-led strategies have also shown promise. The Office of Neighborhood Safety, a city-run department responsible for reducing gun homicides in Richmond, CA, has received national attention for the city's improvements in safety. At the peak of Richmond's violence in 2007, the homicide rate reached 45.9 per 100,000, nearly 10 times the rate of similarly sized cities in California that year.[37] By 2013 the city had a homicide rate of 14.9 per 100,000, down 67% from 2007 – the lowest rate the city has ever reported.[38]

What makes these programs successful at decreasing gun violence? In part, it's who sends the message. Community members who express their pain and suffering and also their love for the young people involved in gun violence make a stronger case for an end to the violence and help establish accountability built upon trust and mutual respect rather than force. Other key components are the alternatives offered to gun violence. Each strategy provides reasonable ways out of a lifestyle of violence, offering individuals support to pursue their educational, professional, and personal goals.

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[34] Roman et al., "Philadelphia CeaseFire, Findings from the Impact Evaluation."
[35] Papachristos and Kirk, "Changing the Street Dynamic."
[36] Purtle et al., "Hospital-Based Violence Prevention."
[37] Wolf et al., "Process Evaluation for the Office of Neighborhood Safety."
[38] See 37

Community-based violence interruption strategies that treat young men as assets rather than liabilities face criticism for this very reason; their existence threatens the image of a criminal worthy of nothing but discipline, who is deserving of any punishment the criminal justice system deems necessary. Though not comprehensive of the changes necessary to reduce gun violence and promote racial and economic equity, local community-based efforts begin to chip away at structural injustices that have historically made both the consequences of gun violence and the alternatives to gun violence uniquely challenging for young men of color.

Data Visualization and Design Decisions

The final data narrative explored in Weapons of Mass Injustice focuses on the gun violence intervention strategies described above, paying particular attention to the framing and language used to describe young people of color most likely to be at the center of daily gun violence. Readers are invited to explore an interactive map of gun homicide rates by state, and local intervention programs aggregated by city and categorized by type. The map includes a tooltip displaying state homicide rates as well as clickable points for select cities with highlighted programs. When clicked upon, the city's program information is displayed within the map legend area.

Though the focus of the project is not on the specific outcomes of local intervention programs but rather their importance as part of a larger integrated set of gun violence reduction strategies, readers are presented with one set of program impacts from the Office of Neighborhood Safety, in Richmond, CA. These graphs highlight reductions in homicide and non-fatal shootings over periods in which the national average remained relatively stable.

This section also draws heavily on SVG based illustration and diagrams that help introduce the concepts upon which local gun violence intervention strategies are based. These design elements are intended to break up the essay's visual flow by providing ways to engage with this information beyond traditional data visualization approaches like the line and bar graphs included in previous sections of the project. Since the final focus of the visual essay is on the humanization rather than the criminalization of people at the center of gun violence, a conscious choice is made to focus on more human and relatable imagery including silhouettes of people and illustrations of the response to highly publicized acts of gun violence such as the mass shooting at Marjory Stoneman Douglas High School in Parkland, Florida and the police shooting of Michael Brown in Ferguson, Missouri.

The visual essay closes by highlighting important work done by movements including March for Our Lives and Black Lives Matter that have brought mass shootings and police shootings to the forefront of media and policy discussions. Finally, readers are asked to reflect on the following questions that together summarize the project's efforts to visualize gun violence data: What will it take to elevate daily gun violence to this national discourse? And how do we reckon with a gun violence crisis that disproportionately kills and criminalizes Black and Brown youth?

As an addendum to the visual essay, further resources are provided on gun violence reduction models, policy and advocacy work, and additional data visualizations related to American Gun Violence.

Discussion

Why visualize urban gun violence reduction?

Where local, community-based violence reduction strategies have gained traction in cities across the US, their maintained support has been threatened by those who are skeptical of non-law-enforcement violence reduction strategies. Though the most effective counter to this skepticism is a decrease in gun violence after program implementation, enough trust and support must first be present in the community for these approaches to prove their potential. Visualizing existing data on urban gun violence reduction can help voters and local governments make informed decisions about which strategies to support.

Data visualization and data journalism are becoming increasingly common in mainstream media and across information-sharing platforms. Their ability to engage readers and relay information quickly make data visualizations a powerful tool. Given the increasing popularity of data visualization in spaces of media, research, advocacy, and policymaking, developers and authors of data-driven narratives should be aware of inequities in the discourse around gun violence in the US and ensure that the visual stories or tools they create push back on problematic characterizations of violence.

There has been a recent emergence of reporting and data journalism focused on the impacts of urban gun violence including The Guardian *Guns and Lies* series[39], The Washington Post articles on *Unequal Justice*[40] and the *2019 fatal force database*[41], and FiveThirtyEight's data visualization of gun deaths in the US.[42] These visual and data-driven articles shed light on the devastating consequences, equity concerns, and stories of local change in response to gun violence. This thesis seeks to contribute to the body of knowledge that highlights urban gun violence as a national public health crisis and inspires both local and national responses.

Integrated approaches & the role of gun policy

In Thomas Abt's 2019 book *Bleeding Out*, he compares reducing urban gun violence to treating a patient's hemorrhaging wound. While measures are certainly needed to prevent the wound from occurring again, immediate action is needed to stop the bleeding and save the patient. Abt

[39] "Guns and Lies."
[40] "Unequal Justice," *Washington Post*, July 25, 2018, https://www.washingtonpost.com/graphics/2018/investigations/black-homicides-arrests/.
[41] "Fatal Force."
[42] Casselman, Conlen, and Fischer-Baum, "Gun Deaths In America."

describes local violence intervention strategies as this immediate action that can help save thousands of lives.[43]

This immediate action is only successful in the long term if accompanied by gun policy change and gun safety investments at local, state, and national levels. While this thesis does not focus on visualizing gun policy solutions, it is important to acknowledge the role of comprehensive policy action in addressing the American gun violence crisis.

Several state-level policy solutions have effectively reduced gun homicides and assaults. Mandatory background checks on licensed and private gun sales and permit to purchase laws requiring safety training can help prevent guns from getting into the wrong hands. Minimum age laws that make private gun purchases illegal under the age of 21 protect young people who are disproportionately impacted by lethal firearm activity. In addition to regulating individual gun sales, limiting multiple handgun purchases over a short period can prevent the circulation of illegal guns. Finally, stricter regulations on gun dealers and decreasing firearm trafficking help make guns less readily accessible in urban communities.[44]

This project's intentional exclusion of visualizations on policy reform is not intended to negate the role of gun control in solving America's gun violence epidemic. Rather, this decision was made because policy level solutions currently receive the most media coverage and alone cannot address the unique drivers of daily gun violence in many urban communities of color. Gun policy and local violence reduction strategies are two vital parts of a larger integrated set of strategies to end lethal firearm activity. Community-based strategies also provide important services that go beyond the policy impacts of saving lives. Meaningful support provided by programs that promote wellbeing through job training, educational opportunities, cognitive behavioral therapy, and transformative life experiences arguably all go beyond Abt's metaphor of merely stopping the bleeding.

[43] Abt, *Bleeding out: The Devastating Consequences of Urban Violence-- and a Bold New Plan for Peace in the Streets*.
[44] "Healing Communities in Crisis."

Conclusion

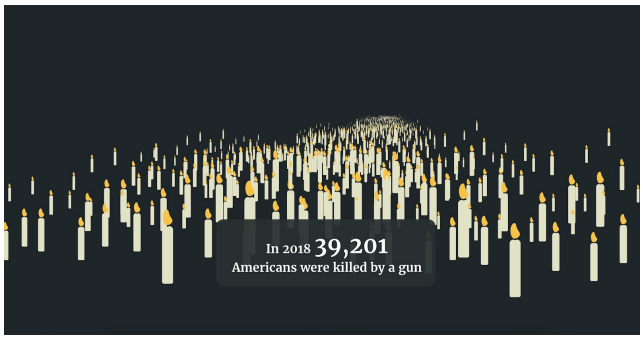
The crisis of American gun violence is well documented, yet much of the research on urban gun violence remains within academic communities. Data visualization and visual explorations of this topic can help translate years of research into easily accessible and engaging narratives useful to policymakers and urban residents alike.

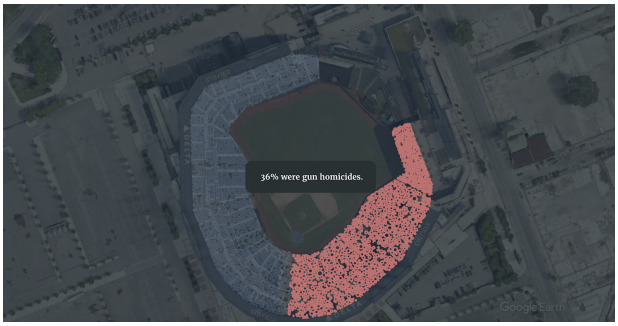
While many Americans, young people, in particular, have mobilized a growing movement against gun violence, much of the mainstream media and policy attention continues to focus on mass shootings rather than the daily gun violence that impacts urban communities of color. The growth of the March for Our Lives movement has been partly attributed to the highly public nature of mass shootings; to the vulnerability of children slain in shootings at Sandy Hook Elementary School in Newton, CT and Marjory Stoneman Douglas High School in Parkland, FL amongst many others; and to the terror that every parent feels knowing that this could happen to their child.

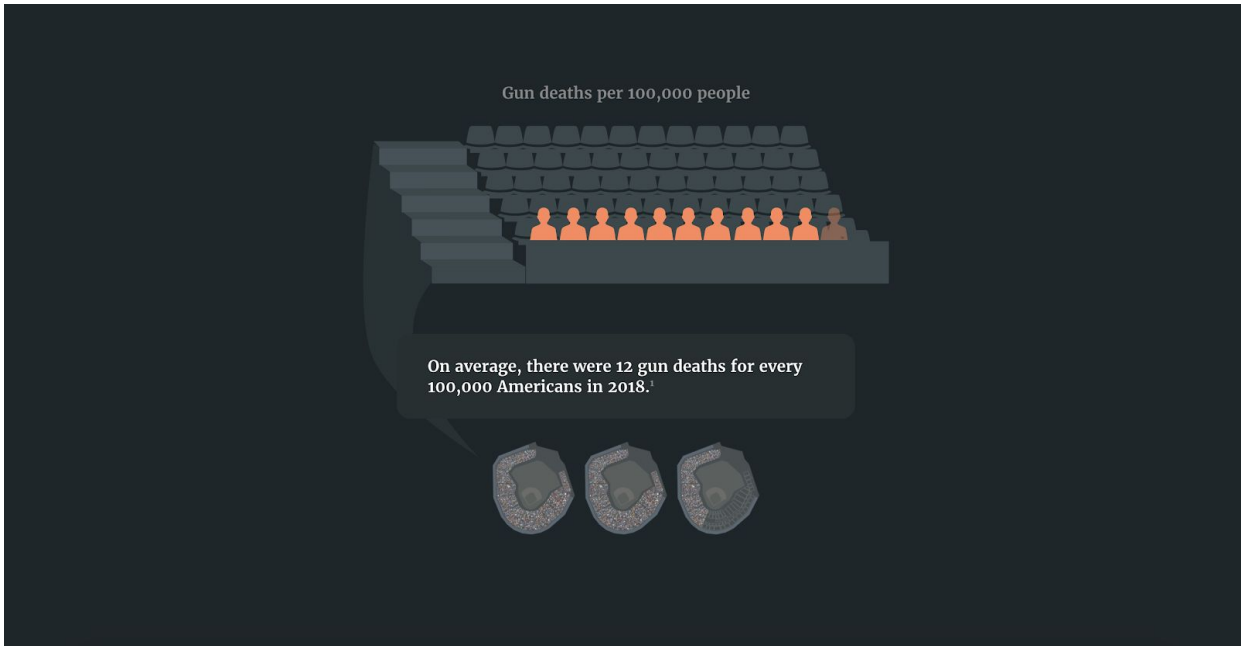
Visualizing urban gun violence is critical for this same reason. Elevating urban gun violence to the local and national spotlight requires humanizing those at the center of the violence. It requires increasing the visibility of pervasive daily gun injuries and increasing awareness of the social and economic costs of gun homicide. Beyond raising awareness, visualizing urban gun violence is about providing evidence-based solutions and stimulating a deeper conversation about the types of responses to violence that Americans support. For Americans whose lives are not touched on a day to day basis by gun violence, visual storytelling can help them relate to those all too familiar with losing loved ones to violence and become part of the solution by supporting violence reduction efforts in their cities.

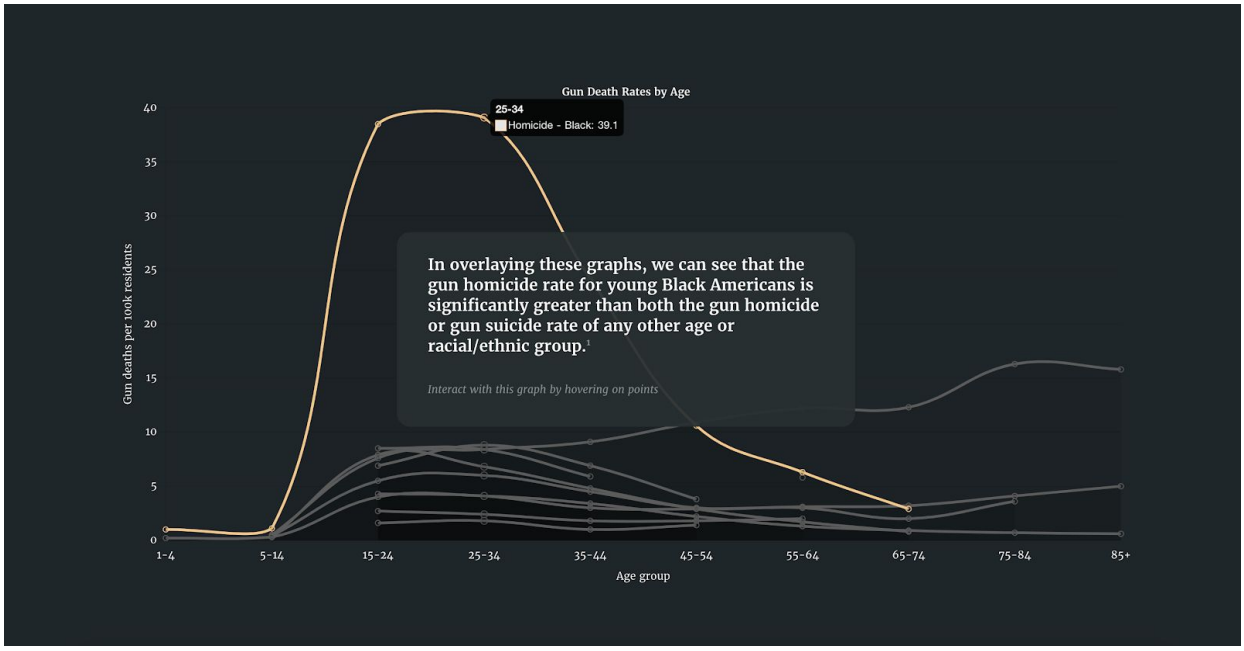
Appendix

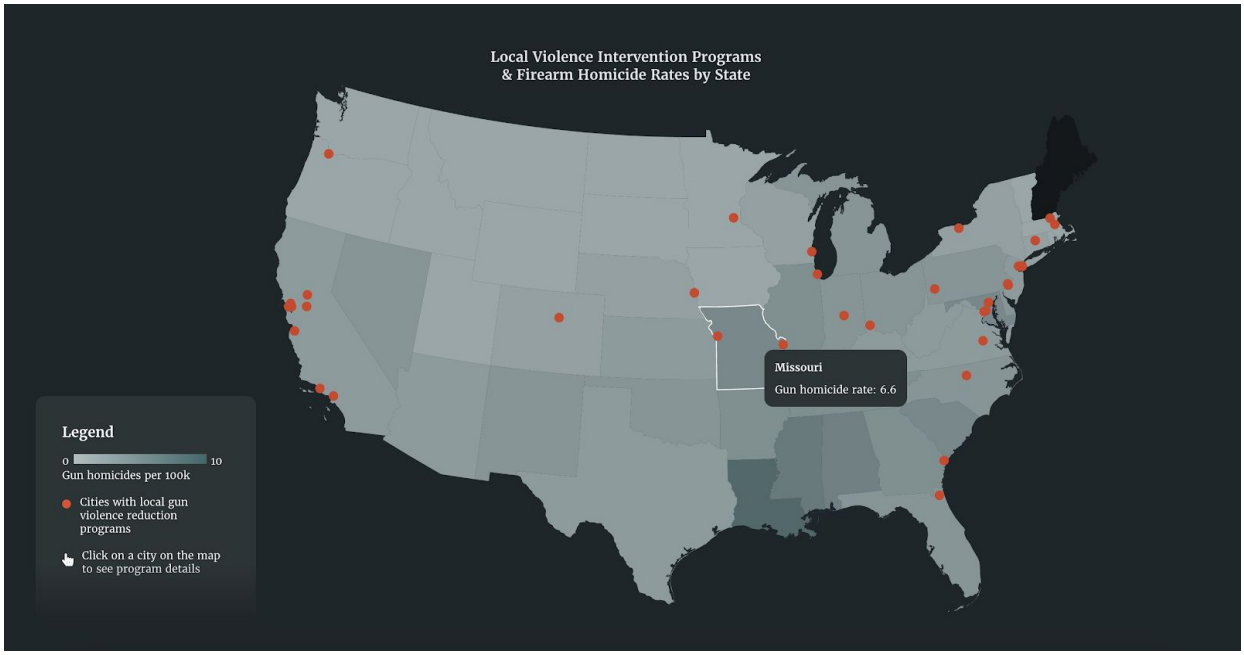
Project Screen Captures

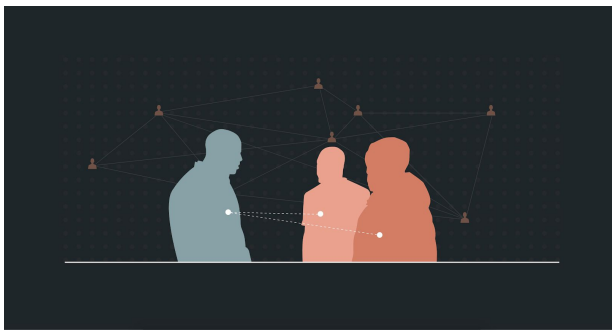


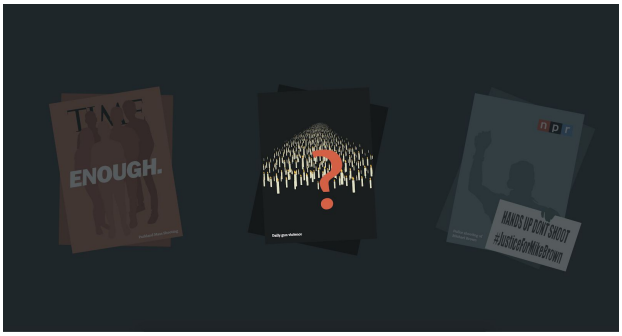





Gun Death Rates by Age
25-34
Homicide - Black: 39.1
In overlaying these graphs, we can see that the gun homicide rate for young Black Americans is significantly greater than both the gun homicide or gun suicide rate of any other age or racial/ethnic group.[1]
Interact with this graph by hovering on points
Gun deaths per 100k residents
40
35
30
25
20
15
10
5
0
1-4
5-14
15-24
25-34
35-44
45-54
55-64
65-74
75-84
85+
Age group


Local Violence Intervention Programs
& Firearm Homicide Rates by State
Missouri
Gun homicide rate: 6.6
Legend
0
10
Gun homicides per 100k
Cities with local gun violence reduction programs
Click on a city on the map to see program details




TIME
ENOUGH.
npr
HANDS UP, DON'T SHOOT
#JusticeForMikeBrown

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