

Cure Violence: Telling the Story of Gun Violence

Andy Enkeboll, Erin Grand, Mayank Misra

Data Science Institute, Columbia University, New York, NY 10027

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ABSTRACT

Cure Violence stops the spread of violence in communities by detecting and interrupting conflicts, identifying and treating the highest risk individuals, and changing social norms. For this capstone project, the team at Columbia worked on developing a cost benefit model showing the monetary savings in a city for each incident Cure Violence mediates. The team also developed a visual heat map of gun violence in Baltimore using JavaScript. The visualization demonstrates a city's changing violence over time, which Cure Violence can use to determine which areas to focus on, as well as to show partners potential cost savings.

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1. Introduction

Cure Violence is a non-profit that focuses on stopping the spread of gun violence in communities by using the methods and strategies associated with disease control, detecting and interrupting conflicts, identifying and treating the highest risk individuals, and changing social norms. Specifically, they focus on:

1. Detecting and interrupting potentially violent events by preventing retaliations and mediating conflicts through on-the-ground efforts within communities.
2. Assessing high risk candidates, changing behavior, and providing treatment through 1-on-1 case work.
3. Engaging the community to change by responding to every shooting, and organizing community events and people.

Through partners at Booz Allen Hamilton, Cure Violence is seeking to make better use of the data they collect and the independent reports that have been written about them. From the outset, Cure Violence has outlined the main goals they have for this capstone:

1. Demonstrate how Cure Violence unique operating model can be deployed across different geographies to reduce violence and increase cost savings to stakeholders both direct and indirect within communities and cities of Cure Violence operations.
2. Data analysis and/or model to inform growth of existing program services
3. Data to inform potential strategic partners & alliances

2. Capstone Plan & Milestones

From the stated goals outlined above, a plan was created mid-semester that more accurately represents what this Capstone project can do in terms of time and people:

1. Cost benefit analysis - simple: How many Incidents were avoided, multiplied by the cost saving scalar, Extract data from public reports
2. Cost benefit analysis - complex: Comparison to national averages in Chicago/Baltimore, Exploration of the government data, Lift of incidents avoided
3. Joining and consolidating internal and external government data sets
4. Solid path forward for cure violence of where to go next from a cost benefit analysis perspective

As the semester neared its end, the milestones were reduced to focus on two specific areas:

1. Cost-benefit analysis:

- (a) How many incidents were avoided, multiplied by the cost saving scalar
 - (b) Extracted data from reports
 - (c) Extracted model from the Mother Jones analysis
2. Visualization of Crime Reports:
- (a) Filter based on type of violence
 - (b) Allows for decisions on where to go next
 - (c) Incorporate cost-benefit analysis results
 - (d) Ability to drop in mediators to view their effects in real time

3. Data Collections and Analysis

The data used in the models and visualizations were acquired from two main sources:

1. Public record paper results from independent researchers in Chicago and Baltimore.
2. City and state open data, largely powered by the Socrata OpenData initiative, for the cities of Chicago, Baltimore and New York.

Public Reports

Three reports have been conducted by researchers in Chicago (Skogan 2007) and Baltimore, (Webster et al. 2013). Each study looked at how the Cure Violence programs were used and assessed the success of the programs. It was found that the Cure Violence framework was applied in Chicago and Baltimore neighborhoods with measurable success.

Site Summary: Baltimore

The John Hopkins team looked at research from two programs in Baltimore. This paper looked at data from the Baltimore Police Department for homicides and nonfatal shootings from January 1, 2003 to December 31, 2010 as well as surveys of program participants from 2007 - 2010. In each program there were 30-40 participants taking surveys and recording internal data.

Three of the four program sites experienced large, statistically significant, program related reductions in homicides or nonfatal shootings without having a counter-balancing significant increase in one of these outcome measures. The models in this summary found that on average, one mediator could mediate one event per month.

Site Summary: Chicago

Raw crime counts showed a 31% reduction in homicide, a 7% reduction in total violent crime, and a 19% reduction in shootings in the targeted districts. These effects are significantly greater than the effects expected given the declining trends in crime in the city as a whole.

The reduced levels of total violent crime, shootings, and homicides remained constant past the time frame of the survey analysis. The effects of the intervention were seen immediately and therefore it is unlikely that effects were only due to increased police activity.

Open Data

The data provided by the Open Data initiatives in each of these cities made it very straightforward to drive our recommendation model. Gun related crime reported provide location information, and each of the cities investigated provide many years of data to work with. Census/population data can be added in as well to determine how similar demographics of cities might be. The Sorcata data that was used, had the format of: CrimeDatetime, Category, Description, Lat, Long. Any dataset in this format could also be used in the final visualization.

Proprietary Data

Cure Violence itself keeps careful data from each intervention. There are:

1. Case notes (interventions)
2. Conflict mediation reports
3. Community Events & participants
4. Crime data reported specifically in the bounds of the neighborhood

Extensions of this project will be able to incorporate these data sets, allowing Cure Violence to extend their reach even further. The team did not use proprietary data in any of the following models or visualizations.

4. Model of Cost Savings

The evaluations of Baltimore and Chicago focused on the correlation between application of the model and related killing and shooting incidences in the area. One of the key objectives of our analysis is to quantify this impact in financial terms.

In an effort to estimate the dollar impact from gun crimes, the team has used the cost categories and estimates described in Mother Jones (Mark Follman and West 2015) on the true cost of gun

violence in America as a template to create a financial model. This analysis was based on the research done by economist Ted Miller of Pacific Institute for Research and Evaluation (Mark A. Cohen and Rossman 1994).

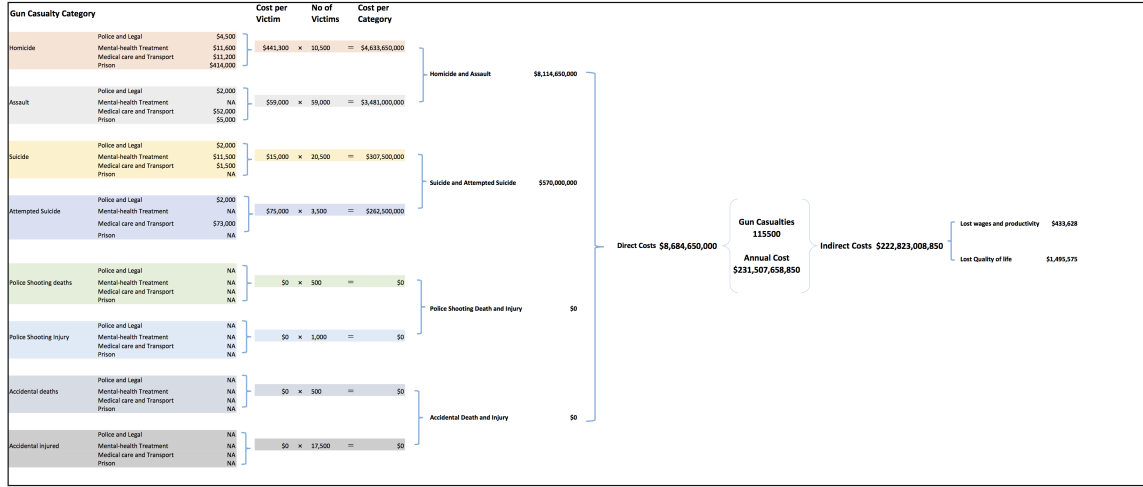


Fig. 1.— Example Cost Model. The full model can be obtained by emailing one of the authors.

Model Assumptions

Our intent with the cost model is to provide an estimate on the dollar impact to the societies where the Cure Violence model was applied. The team made the following decisions to tie the three primary sources on which our cost estimation model is based:

To keep the model simple, the team has rolled up cost categories as described in the Mother Jones article. (1) For direct costs, the 'Police' and 'Legal service and adjudication' categories have been clubbed under 'Police and Legal'. The 'Medical' and 'Emergency transport' categories are aggregated under 'Medical care and Transport' in our model. (2) For indirect costs, 'work cost of victims and perpetrators' and 'cost to employers' are aggregated under 'lost wages and productivity'.

The team recognizes that the way gun crime incidences are defined in the North Western, John Hopkins, and the Mother Jones studies will not match perfectly.

The estimate cost for a particular category were derived, either directly as quoted in the Mother Jones article, or have been deciphered from the graphs accompanying the write up.

5. Visualization

To better tell the story of gun violence, the Columbia team has launched a web tool that overlays a heat map of gun-related crime for a given data set (<https://github.com/enkeboll/crime-heatmaps>). The tool provides the option to filter by crime type (homicide, shooting, robbery,

aggravated assault) as well as drop in mediators to view the tangible effects of Cure Violence practices in a neighborhood.

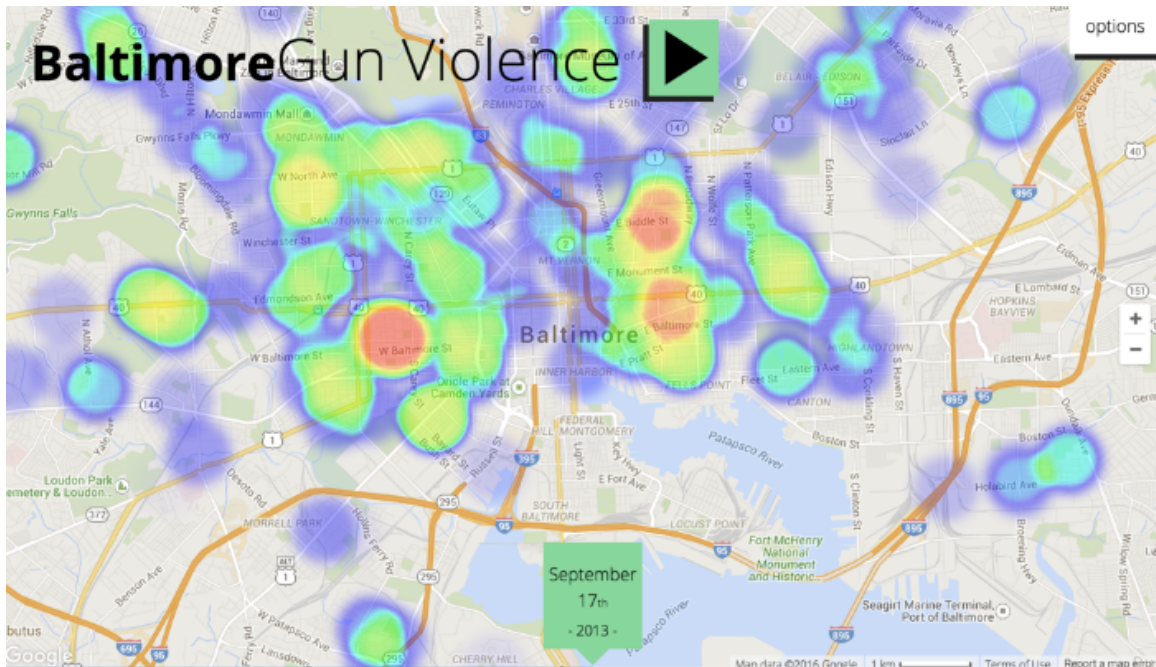


Fig. 2.— This is a screen-shot of the visualization showing the amount of violence in Baltimore in 2013. The visualization tool allows for the user to filter the colors, zoom in and out, and watch how the heatmap changes over time.

Several steps went into the creation of this tool. It is to the credit of the governments of Baltimore, Chicago, and New York that they all use online data portals freely accessible to the public, from which the team was able to pull the data. Each record needed only two of information: a timestamp and a location (lat/long). In order to filter based on crime category, that information should also be included.

With the data ready, a tool had to be found to visualize the data. Patrick Wied has released a client-side heatmapping tool written in JavaScript called heatmap.js (<https://github.com/pa7/heatmap.js>), which works on top of any mapping layer. Google Maps also provides a JavaScript API, so that combo was the best place to start. Lastly, David Hamp-Gonsalves created a front-end GUI (<https://github.com/davidhampgonsalves/crime-heatmaps>) on top of both of these layers that was applied to the project, since CSS and styling wasn't a forte of any of the team members.

The visualization is lightweight and requires no special software, other than a modern browser with which to open the site. As everything is written in JavaScript, HTML, and CSS, there is no code executed on any server— the tool can be distributed to any device and run locally.

The other major benefit of this tool is that it is highly extensible, as is covered in the next section. Cure Violence will be able to demonstrate both the need of unvisited cities, such as Los Angeles or Philadelphia, as well as the effect Cure Violence has had in its existing partnerships with Baltimore, Chicago, and New York.

6. Suggested Steps for Advancing Value from Data for Cure Violence

In order to further advance the value from data to impact core functions of Cure Violence, additional work should be done on this project. The team has built a model and a tool that can be handed over to another group to implement what the team were not able to implement. These things include:

1. Tie in even more data sets: demographics, quality of life, internet usage, etc to build a growth model that can be applied across cities
2. Leverage Web MVP
 - (a) Add additional data (layering / pockets)
 - (b) Create functionality for prioritization of local areas
 - (c) Expand geographies filter
3. Embed a easy to use customer view within Website. Consider optimizing website with something interactive that customers can play with, and make it extensible to other cities
4. Incorporate data from internal data sets be synced with a web presence: show areas of mediator presence and events to highlight impact

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