

**Vacant Properties and Gun Shootings: Empirical Validation of a Core Assumption of the Kensington Renewal Initiative | May 2012**

Joel M. Caplan, Ph.D.  
Leslie W. Kennedy, Ph.D.  
Eric L. Piza, Ph.D.  
Eon Gyung Kim

**Summary of Findings**

Shootings are statistically likely to occur at places in close proximity to vacant parcels. The presence of vacant properties, as a feature of the landscape in Philadelphia, has strong effects on the locations of gun shooting-related crime incidents.

Risky environments resulting from vacant parcels should be taken into account—not only for police resource allocation, but to plan interventions that focus holistically on deterring and incapacitating offenders, hardening targets, and restoring vacant properties to mitigate environmental risks of gun shootings.

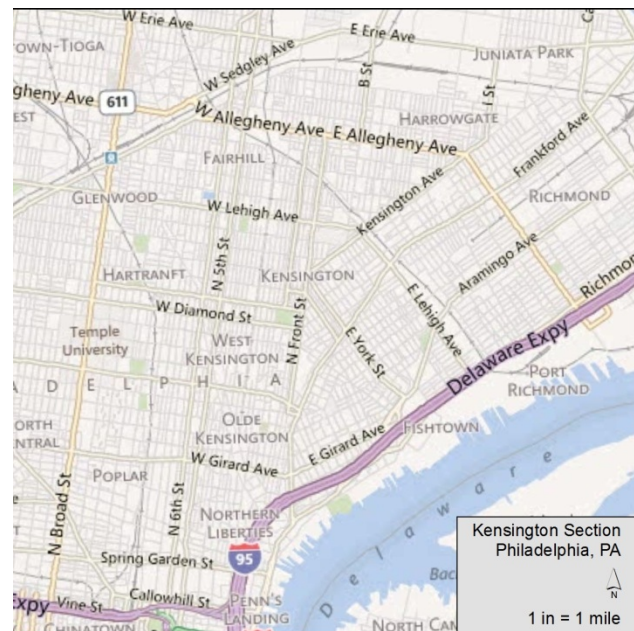
**Background**

Documentary Filmmaker Jamie Moffett started the Kensington Renewal Initiative, a program through which he hopes to restore dilapidated properties and move drug dealers off corners throughout the Kensington neighborhood of Philadelphia, PA. As his website explains (<http://kensingtonrenewal.com>), Jamie takes neglected, under-used properties, rehabilitates them, and sells them at market value, ideally to owner-occupants or long-term renters. Jamie believes that crime rates and vacant properties are directly linked, so he expects that renovating them and increasing the number of owned and occupied properties will decrease both violent and nonviolent criminal activity at and around these places. We used risk terrain modeling methods to cartographically articulate and validate Jamie’s approach using sound scientific methods of spatial analysis.

Risk terrain modeling, or RTM, is an analytical technique that facilitates the examination of multiple datasets that share geography as the common denominator and “paints a picture” onto a digital map of selected events that are statistically likely to occur in areas with similar conditions. RTM utilizes a geographic information system (GIS) to produce “risk terrain” maps showing the presence, absence, or intensity of all attributes at every location throughout the landscape. RTM contextualizes information and offers a statistically valid way to articulate and communicate peoples’ perceptions of spatially correlated phenomena.

Crime is often considered a measure of an area’s livability. With RTM, efforts to invest in communities can be empirically informed and strategically targeted at key factors in manageable areas that have the highest probability of mitigating community-level crime and improving investment potential. See also [www.riskterrainmodeling.com](http://www.riskterrainmodeling.com)

**Study Setting, Data Sources and Methods**



Philadelphia is the largest city in the Commonwealth of Pennsylvania, with a population



of more than 1.5 million according to the 2010 census. Kensington is a neighborhood in the East of Philadelphia—between Fishtown, Port Richmond, and Fairhill sections of the City. Sixty years ago, Kensington had a high employment rate and was full of textile mills, restaurants and small businesses. Today, there are many economic, crime, and housing-related problems.

Address-level vacant property data was provided by the City of Philadelphia, Office of Innovation and Technology, GIS Services Group. The data was originally obtained by the Water Department, which has the most reliable data known to the City because it is maintained and used for storm water billing. Address-level gun shooting-related crime data was provided by the Philadelphia Police Department.

Vacant parcels throughout Philadelphia were operationalized to a risk map layer and tested for place-based correlations with gun shooting-related incident locations using Chi-Square tests and regression analysis. Spatial influence refers to the way in which features of an environment affect places throughout the environment. The spatial influence of vacant parcels was understood as “up to a certain distance from these features are at greatest risk for shootings” because violent disputes with guns in Philadelphia are often linked with drug dealing and drug trafficking due to enforcement of drug debts, arguments with competitors, and establishing control over territory<sup>1</sup>; Drug markets are more likely to be located near vacant properties where the lack of informal surveillance facilitates the drug trade<sup>2</sup>.

The unit of analysis for this study was a micro-level place, selected as a function of street segments: approximately half the mean block length in Philadelphia, or 184 feet. The mean block length in Philadelphia is 367 feet. Empirical research suggests that crime-prone places typically comprise just a couple street blocks, which qualify as behavior settings. Therefore, the spatial influence of vacant properties on gun shooting homicide locations was assessed at up to 1 block (367ft), up to 1.5 blocks (550ft), and up to 2 blocks (734ft) away.

## Key Findings

### Philadelphia Area (Macro Analysis)

Twenty-five percent (25.5%) of all micro-places in Philadelphia are located within 367ft, or 1 block, from a vacant property. These places account for 34% of all gun shooting-related homicides. The spatial relationship between micro-places within one block of a vacant property and gun shootings is statistically significant (Chi-square value=8.79; df=1;  $p<0.01$ ).

Forty-five percent (45.2%) of all micro-places in Philadelphia are located within 550ft, or 1½ block, from a vacant property. These places account for 60.6% of all gun shooting-related homicides. The spatial relationship between micro-places within one and a half blocks of vacant properties and gun shootings is statistically significant (Chi-square value=22.71; df=1;  $p<0.001$ ).

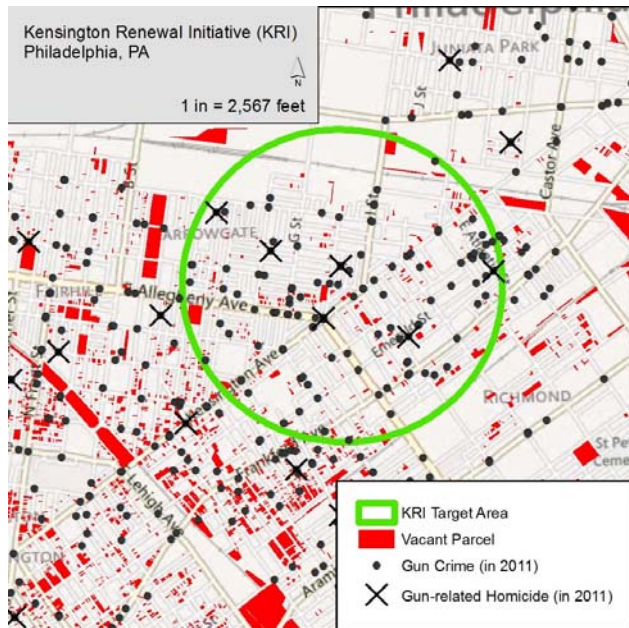
Fifty-eight percent (58.2%) of all micro-places in Philadelphia are located within 734ft, or 2 blocks, from a vacant property. These places account for 73% of all gun shooting-related homicides. The spatial relationship between micro-places within two blocks of vacant properties and gun shootings is statistically significant (Chi-square value=20.85; df=1;  $p<0.001$ ).

According to results from negative binomial regressions, the likelihood of a gun-related homicide at a micro-place in Philadelphia significantly decreases as distance from a vacant property increases (Coef.=−0.0006648; Std. Error=−0.0001441;  $z=-4.61$ ;  $p<0.001$ ; unit of analysis=feet)<sup>3</sup>. Places farther from vacant properties have lower risks of gun-related homicides. For instance, the chance of a gun shooting decreases by more than 24% for every one block (367ft) moved away from a vacant property (Coef.=−0.2439915; Std. Err .0528911;  $z=-4.61$ ;  $p<0.001$ ; unit of analysis=blocks).



### Kensington Renewal Target Area (Micro Analysis)

The Kensington Renewal Initiative's (general) target area was defined as up to a seven block radius (or 2,569ft) from the blockface at 925 E. Westmoreland St.



Three hundred and ninety-five (395) vacant parcels were located within the target area. Also, 128 gun-related crimes in calendar year 2011 were located within this area. All but two (i.e., 126) of these gun-related crimes occurred within 367ft (i.e., 1 block or less) from a vacant property. On average, a vacant parcel was 136ft from a gun-related crime incident location. All gun-related homicides in the target area occurred within 1 block of a vacant property.

The Kensington Renewal Initiative's target area encompasses approximately 21,401,802 ft<sup>2</sup>. Vacant parcels within the target area cover 717,127 ft<sup>2</sup>. Vacant parcels account for about 3% of the target area's landscape, but are significantly spatially correlated with shooting incident locations.

### Recommendation

Given the aforementioned results, interventions should be aimed at mitigating the spatial influence of vacant parcels on gun shooting-related crimes. Contemporary empirical research suggests that interventions be holistic and simultaneously include activities that also relate to the following:

- 1) Evidence-based practices, such as activities related to target-hardening, situational prevention, and/or community awareness. Attention should be paid to identifying particularly problematic locations and developing strategies that involve community and local government agencies to reduce the impact of vacant property on violent crime.
- 2) Using policing activities/patrols to deter and incapacitate known/motivated offenders. Through the application of focused deterrence strategies, reducing repeat offenses in these locations, particularly those that are drug related, would go a long way to making these communities safer.

### Endnotes

- <sup>1</sup> Drucker, J. (2011). Risk Factors of Shootings. *RTM Insights*, 14 [http://www.rutgerscps.org/docs/shootingrisks.pdf]
- <sup>2</sup> Gaziarifoglu, Y. (2011). Risk Factors of Drug Dealing in Open-Air Markets. *RTM Insights*, 13. [http://www.rutgerscps.org/docs/drugrisks.pdf]
- <sup>3</sup> According to a Moran's I test, spatial autocorrelation was not an issue, so a spatial lag variable was not included as a control (Moran's Index=0.00249; Expected Index=-0.000015; Variance=0.000005; z-score=1.169813; p=0.24).

