# CRIME IN BOSTON
Spatial Distribution of Aggravated Assault Risk

Introduction

Crime is an unavoidable problem in people's life. Some potential factors have been affecting people's life and property security. Particularly in densely populated cities, complicated social structures exacerbate some crime problems. By locating the hot spots of crime in the city, people can summarize the spatial distribution pattern of crime and should help police deploy their limited resources more effectively. This project mainly focuses on a certain type of crime, aggravated assault in the city of Boston, analyzing its spatial pattern from 2015 to 2019, in the hope of summarizing the hot spots of aggravated assault in Boston and exploring their correlation with social and economic factors, and spatial factors.

From 2015 to 2019, there were 10687 aggravated assault cases in Boston, while 752 cases lack of spatial information, so finally 9935 cases are mapped. I took block group as spatial unit, combining with the population of each block group to get the crime rate (see *Aggravated assault rate*).

Aggravated assault rate

The crime rate is clearly concentrated in some areas, such as Downtown, Dorchester and Roxbury. Why do these areas have higher crime rates? What is it related to? That's what I'm going to talk about.
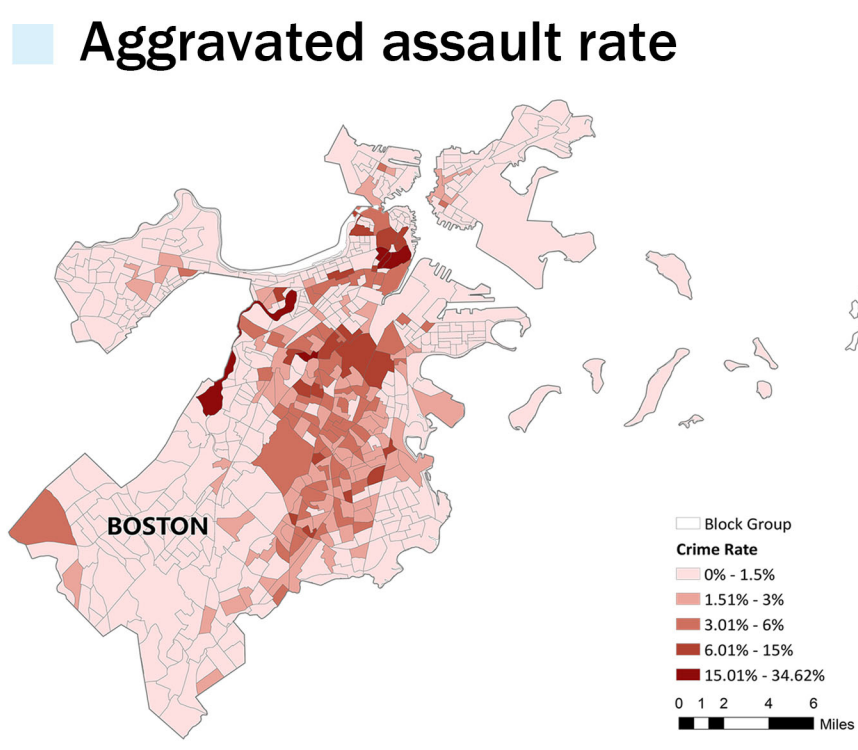
Methods

Data Collection: Besides the crime data from Analyze Boston, the data I collected is divided into two categories: spatial data and demographic data. According to Drawve and Barnum 2018 articles, aggravated assault risky areas including bars, liquor stores, fast-food restaurants, convenience mart, bus stop, public high school, etc. Data are derived from U.S. Business, Analyze Boston and MassGIS. Demographic data is derived from Social Explorer.

Analysis: To determine the correlation between demographic data and aggravated assault probability, I mainly used the Local Moran's I to compare the aggravated assault sites to various factors. If there is a high similarity of the high-high and low-low cluster between a factor and aggravated assault rate, then it can be concluded that the factor is related to the risk of aggravated assault. I found that the unemployment rate, high education (college) rate, median household income, and home values (median gross rent) is related to the aggravated assault risk through comparison. The higher the unemployment rate, the lower the high education rate, median household income, and median gross rent are, the higher risk of aggravated assault occurs.

In the end, I used Euclidean Distance and Reclassify to generate bus stops, public high school, and commercial risk place (including bar, liquor stores, fast-food restaurant, convenience mart) layers. And used Polygon to Raster to generate unemployment rate, high education(college) rate, median household income, and median gross rent layers. Using these factors for the measure of aggravated assault risk, I created *the Boston Aggravated Assault Risk Map* through Raster Calculator.

Conclusion

This project map the risk of aggravated assault based on the current crime rate, high risk place, and related socio-economic factors. from the risk map, we can see that Downtown Boston, Fenway-Kenmore, Roxbury, and Dorchester have a high risk of aggravated assault. More police force could be considered in these areas in the future. Likewise, the socio-economic factors behind the high risk of crime deserve attention. Only when the living standards and happiness of people in these places are improved, can the risk of crime be truly reduced.

There are many shortcomings in this project, such as not considering the weight of factors, and many other factors that may contribute to the aggravation assault rate are not taken into account. These are worthy of further analysis and demonstration.
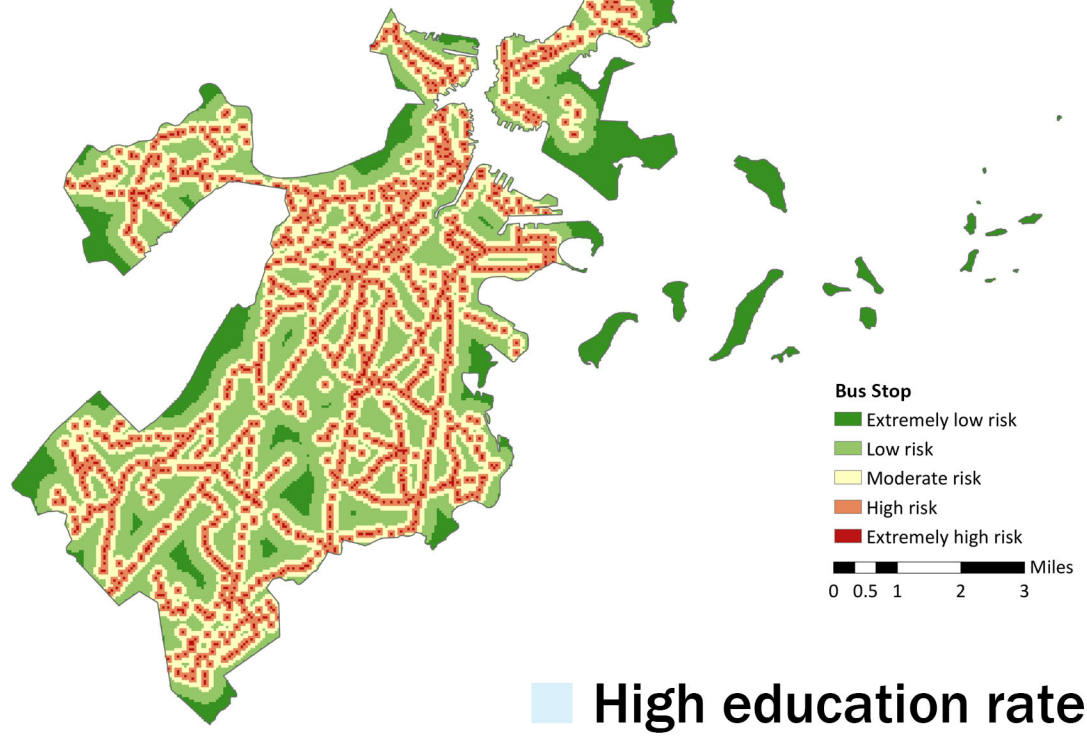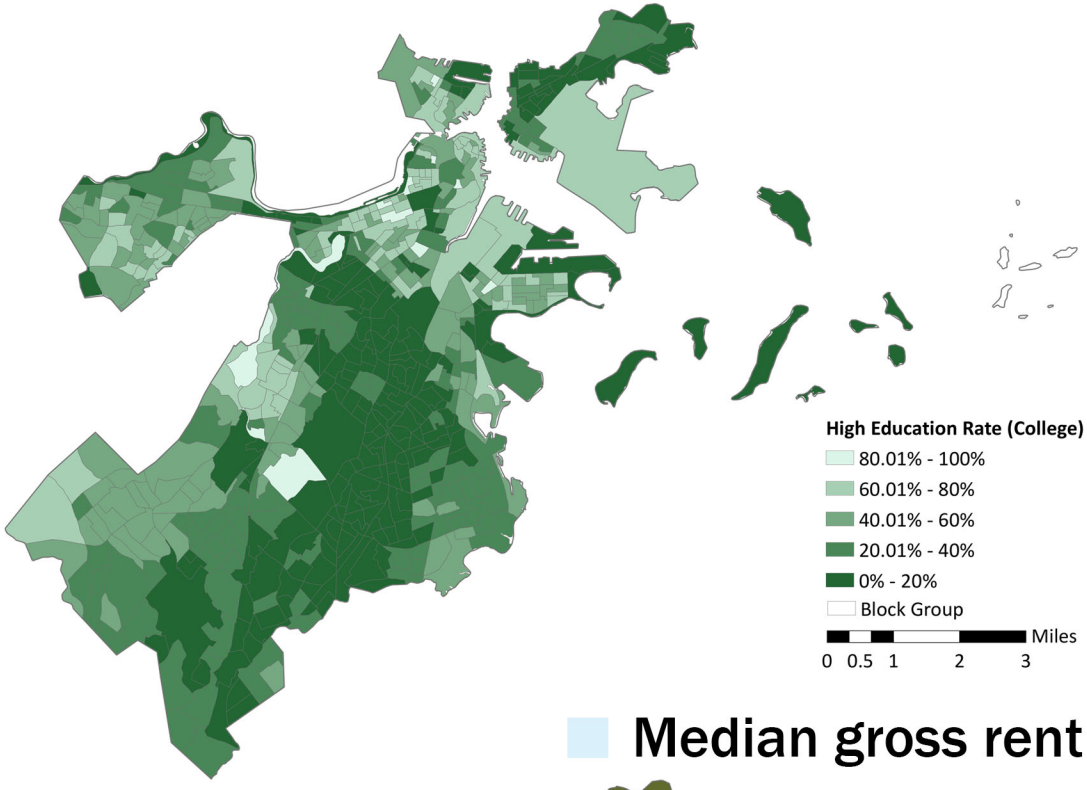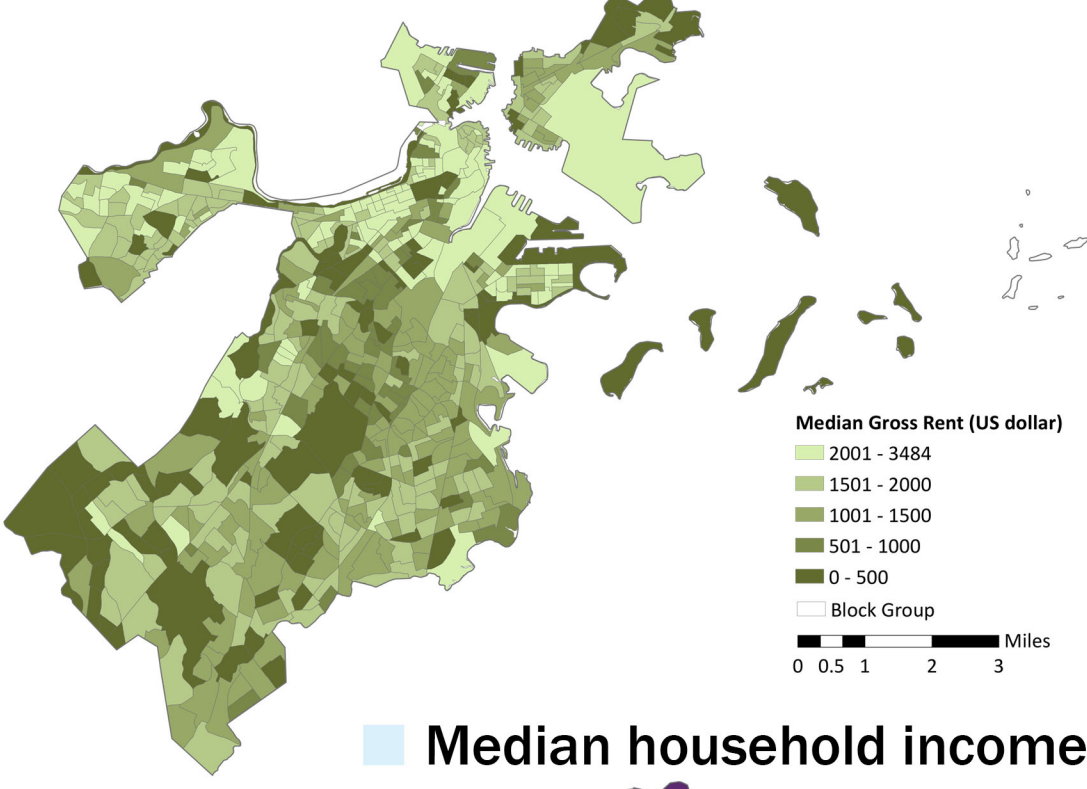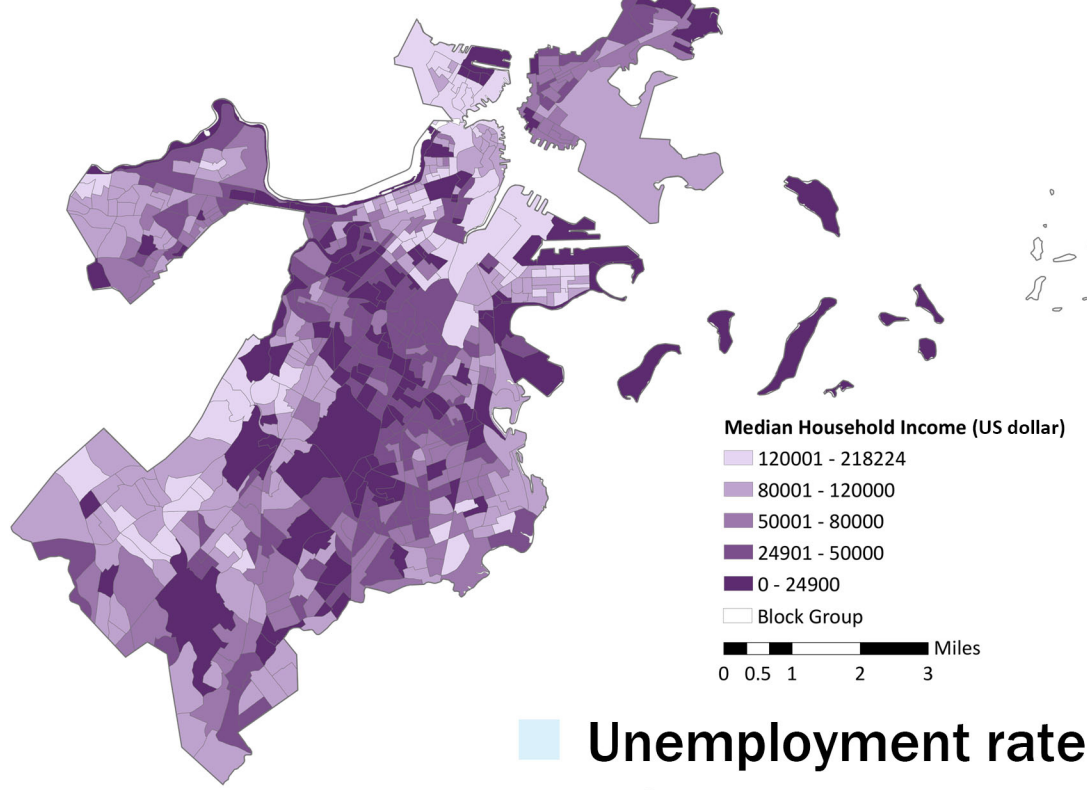
Commercial risk place
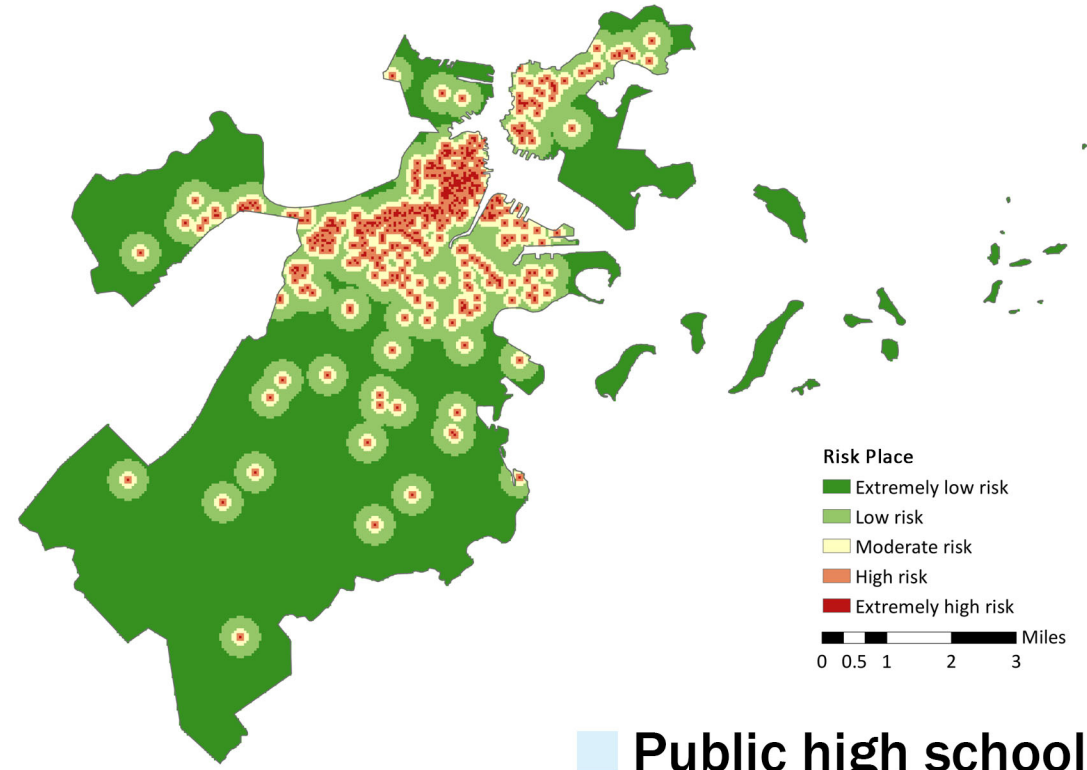
Public high school
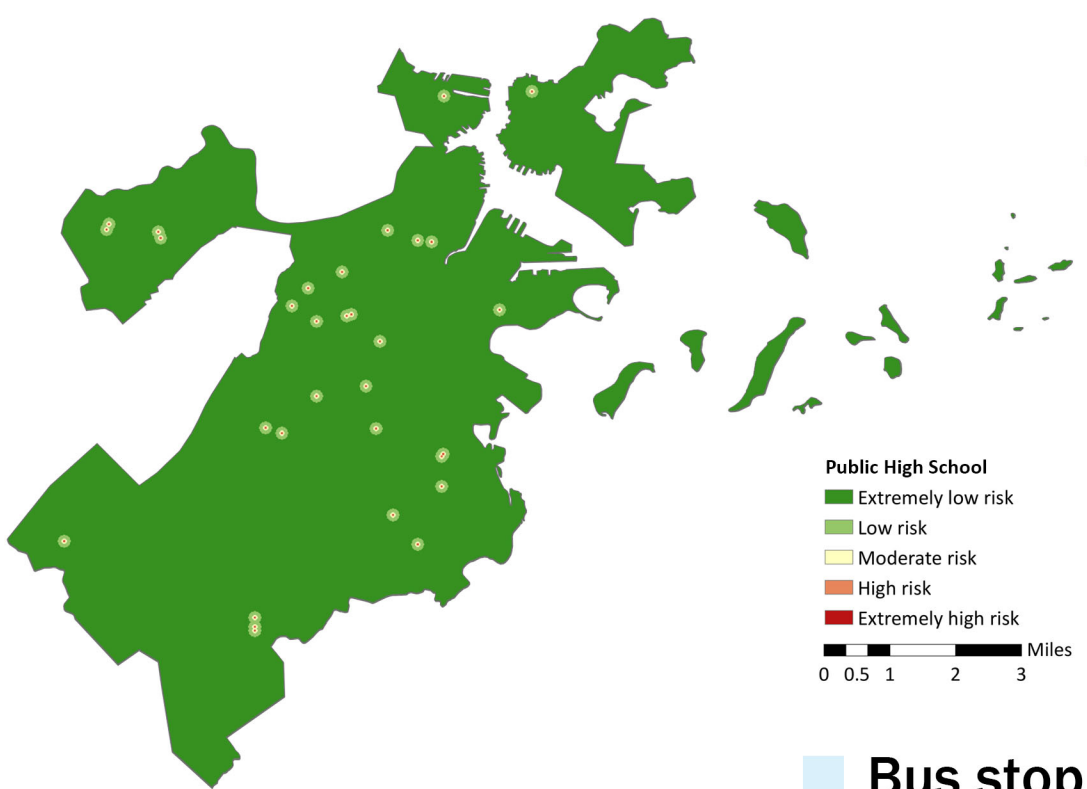
Bus stop

High education rate

Median gross rent

Median household income

Unemployment rate
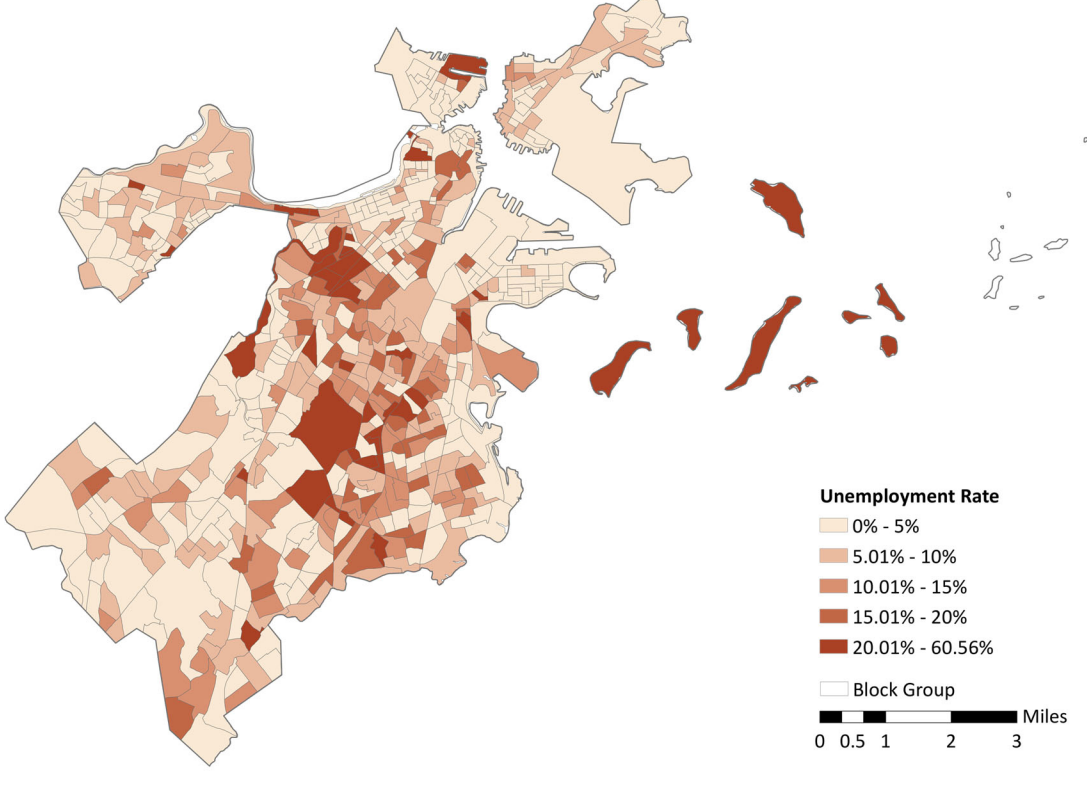
Boston Aggravated Assault Risk
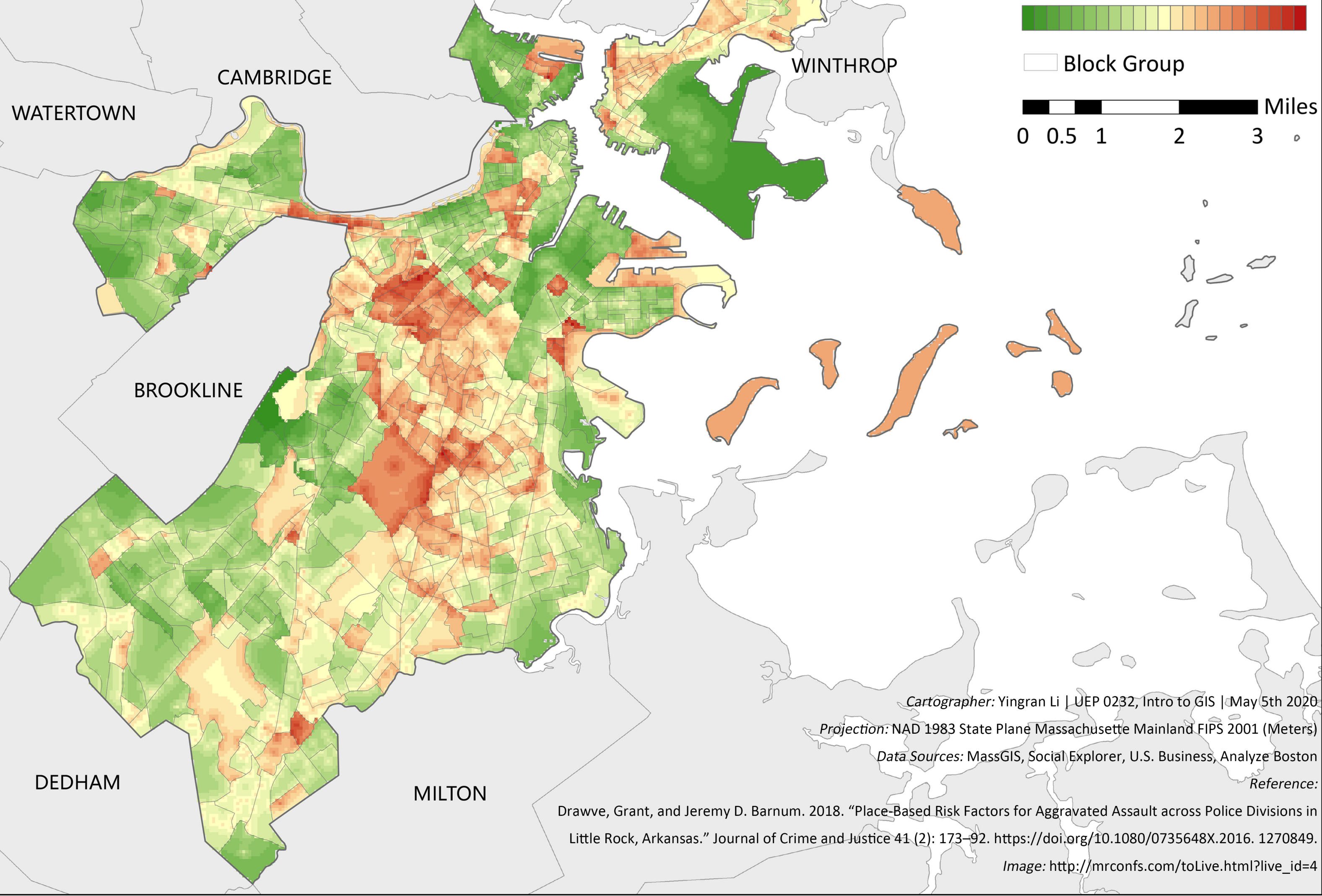
Low risk — High risk

Block Group

Miles: 0 0.5 1 2 3

WATERTOWN, CAMBRIDGE, WINTHROP, BROOKLINE, DEDHAM, MILTON

Reference:
Drawve, Grant, and Jeremy D. Barnum. 2018. "Place-Based Risk Factors for Aggravated Assault across Police Divisions in Little Rock, Arkansas." Journal of Crime and Justice 41 (2): 173–92. https://doi.org/10.1080/0735648X.2016. 1270849.
Image: http://mrconfs.com/toLive.html?live_id=4