



Supplementary Materials for

Temporal and Spatial Shifts in Gun Violence, Before and After a Historic Police Killing in Minneapolis

Authors: Ryan P. Larson, N. Jeanie Santaularia, and Christopher Uggen
Correspondence to: lars3965@umn.edu

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Materials and Methods

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Minnesota Hospital Discharge data was used to create our dependent variable, firearm assault injuries. Inpatient and outpatient data from 2016-2020 utilizing International Classification of Diseases (ICD)-10 codes X93-X95 were used to define firearm assault injuries. Requests for these data can be made via the Minnesota Hospital Association (<https://portal.mnhospitals.org/>).

Spatial Zip Code Tabulation Area (ZCTA) simple feature boundary attributes, and each geography's corresponding yearly American Community Survey (ACS) data, was accessed from The Census Bureau's API using the tidycensus package in R (15). These data and boundary attributes can also be accessed through the IPUMS USA dataset (16). A boundary shapefile for the city boundaries of Minneapolis was accessed from the City of Minneapolis' open data portal (<https://opendata.minneapolismn.gov/>). ZCTAs representing Minneapolis were determined by spatial intersection with the Minneapolis city boundary. Additionally, intersecting neighbors were defined by first-order queen contiguity, which defines neighbors as ZCTAs that share either a common border or common vertex (i.e., a "corner"), and were not part of St. Paul, MN.

To measure the effects of the events of interest, we create time indicators that measure the average rate in the period as compared to the pre-killing baseline, following previous empirical work on crime rates in Baltimore (5,6). We create event indicators at four key points, two of which are related to the COVID-19 pandemic: 3/13/2020 at the inception of Governor Walz's State of Emergency order, and from 3/28-2020-5/28/2020 at the introduction and conclusion of Governor Walz's Stay at Home order. These time indicators adjust for changes in firearm assault incidence related to significant policy events in the course of the COVID-19 pandemic and related patterns of social interaction. The key time indicators of interest are the police killing of George Floyd on 5/25/2020 (post-killing), and three months after this event, dated 8/25/2020 (three-months post-killing). These are the focal time indicators of interest in the analysis, and represent changes in firearm assault incidence in those time periods as compared to periods in the pre-killing period.

We also merge measures of seasonality onto the weekly hospital data. Following previous scholarship (5,6) we include the weekly maximum temperature (degrees Fahrenheit), snowfall (in.), and precipitation (in.) from the Minnesota Department of Natural Resources as measured at the Minneapolis/St. Paul Threaded Record station (<https://www.dnr.state.mn.us/climate/historical/daily-data.html?sid=mspthr&sname=Minneapolis/St%20Paul%20Threaded%20Record&sdate=2010-01-01&edate=por>). A measure of the average weekly number of hours of dark before 12pm is also included as further adjustment for seasonality¹. Finally, we construct the proportion of days in the week K-12 Minneapolis Public Schools were in session based on school calendars from 2016-2020 (<https://mpls.k12.mn.us/calendars>).

We also merge in measures of police behavior from the Minneapolis Police Department (<https://opendata.minneapolismn.gov/>). Specifically, we aggregate reported use of force incidents, police stops, and officer-involved shootings to both the week and ZCTA-week level

¹ This measure is calculated via the 'suncalc' package in R, which, conditional on the week and location, calculates the sunset on each particular day. We then calculate the time difference between sunset and midnight. We aggregate this to the average amount per day in each to represent our weekly measure of darkness before 12 midnight.

from 2016-2020, placing each incident in each ZCTA-week by the date of incident and the longitude and latitude coordinates of the location of the event.

Our analytical strategy is two-fold: we first estimate interrupted time-series models on week-level data², then estimate fixed-effects panel models on Zip Code Tabulation Area (ZCTA)-week level data to corroborate the aggregate findings with *within-ZCTA comparisons*, which net out time-constant unobserved heterogeneity. Finally, we estimate ZCTA-specific post-killing effects³ to examine the spatial heterogeneity in the post-killing effect across communities. All data and code for data manipulation, merging, and analysis, apart from the restricted MHA data, are available in an online GitHub repository (<https://github.com/ryanplarson/Gun-Violence-MN>).

² Significant autocorrelation was detected at a lag of 1 in partial autocorrelation functions of the residuals, and therefore an AR(1) component was added to the model to account for this serial dependence.

³ These are calculated by estimating interaction effects between the time indicators and ZCTA fixed effects, and combining the main effects and interaction effects within each ZCTA.