

Data

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Data Sources

The main sample is a daily-level panel (2016-2022) constructed using several administrative data sets obtained through Freedom of Information Act requests including Chicago Police Department (CPD) 911 call dispatches, officer shifts, and ShotSpotter activation dates.¹ Additionally, these data are supplemented with reported incidents of crime, gun victimization, and ShotSpotter alerts downloaded from Chicago's Open Data Portal.

The CPD 911 call dispatch data encompasses all 911 calls that led to the dispatch of a CPD officer to the reported crime scene. This administrative data is rich, containing information on the time of the 911 call, the time an officer is dispatched to the scene of the crime, and the time the officer arrives on-scene—each recorded at the hour-minute-seconds level and captures details including the priority, description, location, and whether an arrest is made. Based on this information, we construct the two main outcome variables: the time from a 911 call to an officer dispatch (call-to-dispatch) and the time from a 911 call to an officer's arrival (call-to-on-scene). Notably, while call-to-dispatch contains no missing data, approximately 52% of the call-to-on-scene information is missing due to officers failing to report when they arrive at the scene. However, we address this potential limitation in Appendix BLANK where we find little evidence of significant changes in the frequency of officers failing to report their on-scene time.

The police shift data contains information on every shift start time, end time, and district/beat assignment worked by CPD staff in the sample period. We restrict the shift data to include only police officers that are present for duty, excluding administrative positions and higher level managerial roles such as police lieutenants and police chiefs. To assess officer availability, we construct the number of officer hours within a police district-day. By using on the number of officer hours rather than the number of shifts, we account for the possibility of overtime or early-leave.

The ShotSpotter activation dates show the month and year that each police district activated the ShotSpotter technology. However, since this information lacks the exact day of activation, we utilize the ShotSpotter alert data which shows the number of ShotSpotter alerts at the minute-level. This allows us to determine the specific day of the month when ShotSpotter became active in each district. Nonetheless, in districts 6, 9, 10, and 15, the activation months slightly deviate from the number of ShotSpotter alerts. In particular, these districts have no ShotSpotter alerts until several months after their official activation date. Therefore, we adjust these four dates of activation to align with the onset of ShotSpotter alerts. This adjustment ensures that the effects observed are accurately attributed to police officer responding to ShotSpotter alerts. However, we estimate our results using the official dates in Section BLANK and find that our results remain consistent, albeit slightly attenuated. Figure BLANK shows the trend of ShotSpotter alerts along with the official activation dates (blue) and our interpreted activation dates (red).

Sample Restrictions

We restrict the sample to only 911 calls of priorities 1 (immediate dispatch), 2 (rapid dispatch), and 3 (routine dispatch). Priorities 0 and 4 are omitted as these are reserved for special cases and administrative

¹We restrict officer shifts to only sworn police officers who are present for their shift.

designations such as a police officer in a life-threatening circumstance or a police beat-meeting.² These exclusions account for only $\sim 0.04\%$ of the total number of 911 calls. By including only priorities 1-3, the analysis focuses only on the call types that are most commonplace in day-to-day operations.

Three further restrictions are implemented to reduce sensitivity of the estimates. First, any observations that have a non-positive call-to-dispatch or call-to-on-scene time are dropped, accounting for approximately 0.03% of the data. Second, for each priority level, call-to-dispatch and call-to-on-scene outliers that exceed three standard deviations from the mean are omitted. This is done to mitigate the impact of outliers on ordinary least squares regression, which is sensitive to extreme values. We relax this restriction in Section BLANK to verify the consistency of the results. Last, specific dates including January 1, July 4, and December 31 are excluded from the analysis. These dates coincide with celebratory gunfire and fireworks that may generate false-positive ShotSpotter alerts.

Descriptive Statistics

Each data source is aggregated to the district-day level and matched by district and date. Importantly, both call-to-dispatch and call-to-on-scene times are averaged, and hence, these outcomes are interpreted as average daily response times within a police district-day. Conversely, officer hours, ShotSpotter alerts, crimes and arrests are aggregated as counts and therefore represent the number of occurrences within a police district-day.

Table ?? shows summary statistics of the main outcome variables and corresponding control variables, all presented at the police district-day level. Panel A shows that the time to dispatch a police officer to the crime scene for priority 1 911 calls (Call-to-Dispatch) is approximately 5 minutes, while it takes police officers an additional 8 minutes on average to arrive to the scene. Priority 1 calls are the most frequent as shown in Panel B, and police officers are dispatched approximately 150 times a day within a district. Moreover, for every 100 police dispatches, there are approximately 14 arrests made (Arrest Rate). Considering the high level of crime in the South and West locations of Chicago, the presence of officers varies considerably across districts, ranging from as little as 200 officer-hours or as high as 3431 officer-hours. We later analyze this heterogeneity in officer hours in Section BLANK where we find longer response times when there are fewer officers.

²It is likely that the extremely small portion of priority 4 calls observed are misclassified as it is unlikely a 911 call results in a beat meeting.