"Is electronic monitoring contributing to gun violence?"

I. Introduction

Amid a historic rise in gun violence, debates about the underlying factors driving the surge in Chicago have grown to include electronic monitoring (EM), a condition of pretrial release that equips people who have been arrested and assigned to EM with a GPS-monitored ankle bracelet while awaiting trial from home instead of jail. However, the lack of easily accessible public data makes it difficult for all sides to agree on the basic facts about EM and its potential effects on public safety. Analysis of the data we've received from the Cook County Sheriff's Office (CCSO) allows us to ground the debate about EM in a few essential takeaways: for one, it's an oversimplification to say that EM is driving gun violence in Chicago, given the timing of the relevant changes in the justice system and the small number of people arrested for gun violence while out on EM compared to overall victimizations.

Nonetheless, the makeup of who is on EM has changed over the past few years: while the largest increase in the use of EM was for gun possession offenses, the number of people on EM for a homicide or shooting is also much higher than it was in 2016. We also see in the data that people out on EM are themselves victims of violence at a much higher rate than others in the city, suggesting that there's more to be done to connect people on EM to helpful social services.

In any data analysis, there are numerous details about both the data and analytical methods that can be important for understanding the nuances of what the data can and can't tell us, as well as reasonable alternative choices about how to analyze the data, interpret and present the results, and address some of the limitations of the data themselves. Because of the space constraints in the article, we have omitted many of those details and sensitivity analyses from the published version. We provide those additional details here.

II. Terminology and Data Sources

Booking definition
For the purposes of this analysis, we use "booking" as a shorthand to refer to the period under CCSO custody following an arrest. Someone can spend their time in

more than one type of CCSO custody—for example, spending some days in jail, followed by a stint on EM, followed by another period in jail. Our intake and custody data (described below) offer details about the trajectory of the booking.

Data sources
There are two separate adult EM programs in Chicago, one through the Chief Judge's Office (CJO) and one through the Cook County Sheriff's Office (CCSO). We only have access to data through CCSO and draw only from the CCSO data when making inferences about EM.

Summaries of CJO and CCSO EM populations indicate that the CJO's EM program—for which we do not have data—consistently accounts for about 40% of the county's EM population over the past few months:

Date	CJO EM Population	CCSO EM Population	CJO's Portion of Total EM Population	Sources
4/22/22	1667	2364	41%	CJO Source; CCSO Source
4/8/22	1609	2415	40%	CJO Source; CCSO Source
3/25/22	1622	2443	40%	CJO Source; CCSO Source
3/4/22	1642	2515	39%	CJO Source; CCSO Source
2/25/22	1660	2528	40%	CJO Source; CCSO Source
2/9/22	1677	2558	40%	CJO Source; CCSO Source

The CCSO data is comprised of two primary data sets:
1. The **intake data** contains one record per booking with start and end dates for the booking, as well as identifying information and a few demographic measures (such as age and race). We have data on bookings up to mid-October 2021, but only analyze bookings up to the end of September 2021 to ensure analyses reflect full months.
2. The **custody assignment data** contains a daily snapshot of all people in CCSO custody. For each custody assignment, we see where a given person is held and the dates during which they are held. This data captures every

change in custody (e.g., from Cook County Jail to being released on EM) that a person experiences and is the main dataset we use to identify events that occur while people are on EM. For custody assignments that had not yet ended as of September 2021, we fill in 9/30/21 as the final date of custody for the purpose of our analysis. Note that we do not necessarily see in our data every day that a booking is open before a case is resolved because some days could be spent outside of CCSO custody (e.g. while released on bond) and therefore not visible in the custody assignment data.

Note on the processing of custody assignment data: For records that have a missing end date (e.g., the data shows that someone was in Location A starting on Monday, in Location B starting on Thursday, and ended their time in Location B on Sunday, but does not record when they ended their time in Location A), we assign the start date of the next custody assignment record so that each stint is exclusive and consecutive (so the cleaned data from the previous example would then show the person in Location A from Monday to Wednesday and in Location B from Thursday to Sunday).

For information on offenses, we combine the CCSO data with CPD data on arrests and victimizations.

## III. Exhibits and Additional Analysis

1. National Jail Incarceration Rate

Jail detention is primarily used for people awaiting trial (also known as pre-trial detention), and for people convicted of misdemeanors, while prisons hold people who have been sentenced to detention for felony cases.

Most jail stays are much shorter than prison stays; according to the Bureau of Justice Statistics, people released in 2018 spent an average of 2.7 years in prison while jail stays in 2017 averaged 26 days. That means the number of people who spend time in jail in a given year (the "flow") is much larger than the current population in jail (the "stock") at a given point in time, and also much larger than the population in prison at a given point in time.

The figure below shows the number of inmates held in jails across the U.S. as of the last weekday in June, a standard measure reported by the Bureau of Justice Statistics. The figure has been scaled to a rate per 100,000 people to account for population growth.
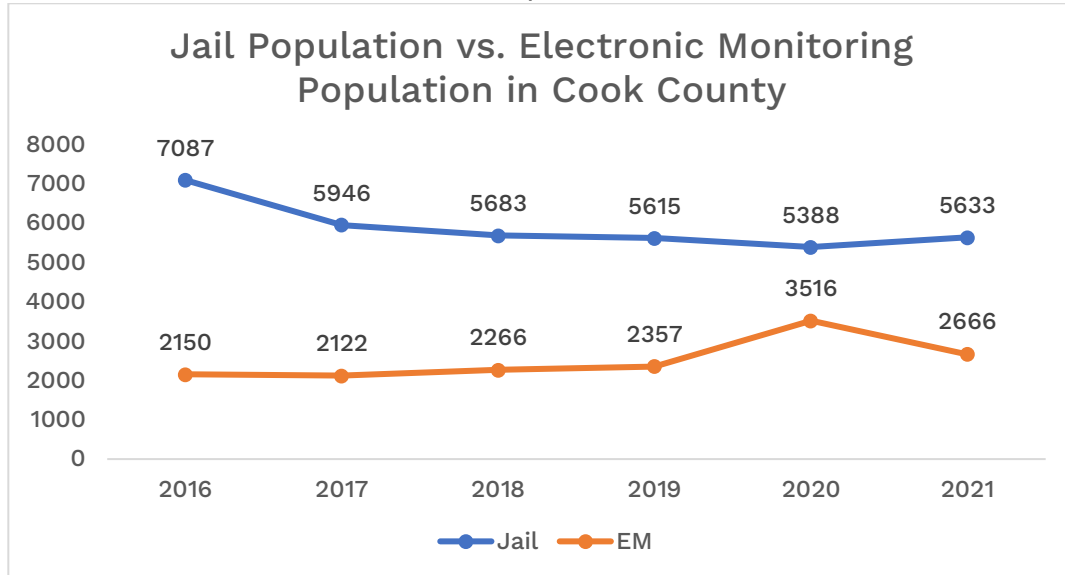
Figure 1.1: National Jail Incarceration Rate per 100,000
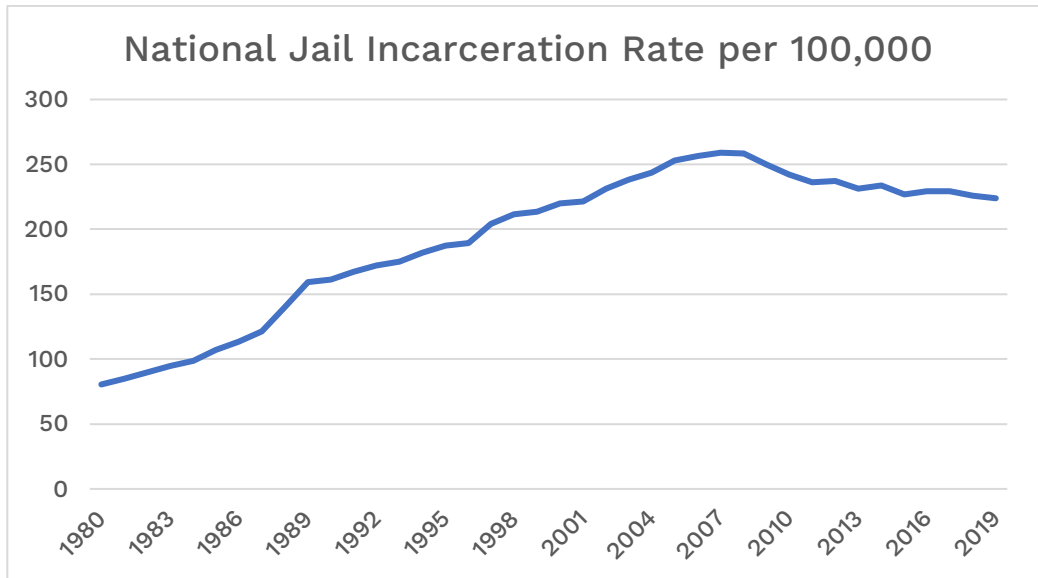
This chart depicts the national jail incarceration rate per 100,000 people. Source: The national jail population is drawn from the 1999 Bureau of Justice Statistics sourcebook for 1980-1999, from the Bureau of Justice Statistics Jail Inmates at Midyear 2014 report for 2000-2014, and from the Bureau of Justice Statistics Jail Inmates at Midyear 2020 report for 2015-2020. National population data is drawn from Google Data Commons.

## 2. Electronic Monitoring and Jail Populations

Figure 2.1: Jail Population vs. Electronic Monitoring Population in Cook County (Snapshot)

Jail Population vs. Electronic Monitoring Population in Cook County

Year	Jail	EM
2016	7087	2150
2017	5946	2122
2018	5683	2266
2019	5615	2357
2020	5388	3516
2021	5633	2666

This chart depicts the population in CCSO custody in jail at the end of each year (December 31 2016-2021) as well the number of people currently out on EM as of the end of each year. Source: CCSO.

Figure 2.1 is what we presented in the article. The advantage of showing the trends by end-of-year jail populations is to make it easier to see the longer-term patterns. The downside is that there can sometimes be substantial variation in jail populations from month to month within a given year due to some combination of changes in criminal justice system practices and overall crime rates (for example, due to seasonal patterns in crime). Figure 2.2 shows the data aggregated at the monthly level rather than the annual level.

Figure 2.2: EM and Jail Populations in Cook County by Month

EM and Jail Populations by Month
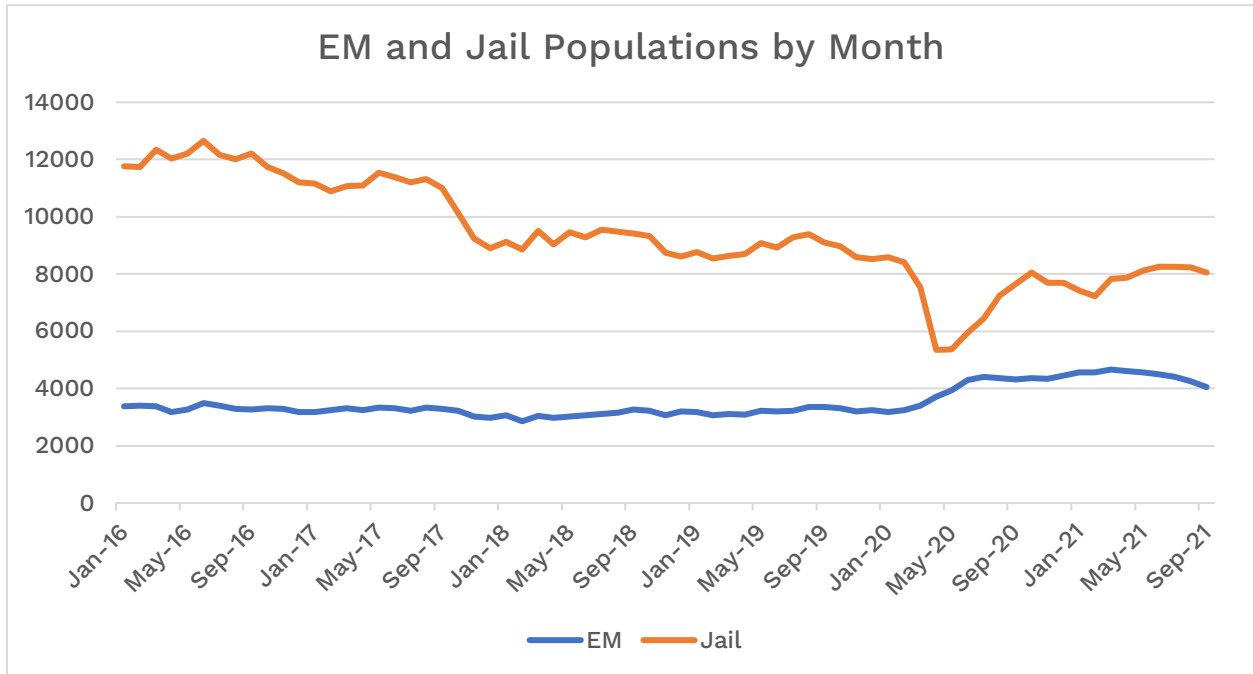
This chart depicts the total number of bookings on EM or in CCSO jail custody over the course of each month. Source: CCSO custody assignment data.

People on EM can show up as **AWOL,** meaning that the CCSO can no longer track their location.

According to CCSO:

> *An individual may be declared from AWOL from EM when one or more of the following happens:*
>
> - *A subject removes or destroys their monitoring equipment*
> - *A subject has an unauthorized absence from their host site and the subject cannot be subsequently located – the unauthorized absence is verified either by tracing the EM/GPS equipment or after a residential visit was conducted by a field unit*
> - *A subject is actively fleeing law enforcement*
>
> *[CCSO] make[s] every attempt to locate the individual prior to declaring AWOL, and this usually occurs for three (3) consecutive shifts with the exception of cases where [CCSO] know[s] equipment has been removed or destroyed or in cases where the GPS*

device is not able to be traced and [CCSO has] attempted to locate the individual and [has] been unsuccessful.

For the purposes of this analysis, we consider people who were on EM but whose status has been updated to AWOL to still be "out on EM." To see how our results do or don't change under a different classification decision, Figure 2.3 depicts the relative populations of people actively on EM vs. on AWOL EM. The figure shows that most of the variation over time comes from people actively on EM, rather than AWOL EM.

Note that people who are AWOL may remain AWOL for a long time, meaning the mix of people making up the AWOL EM population may be fairly constant over time. This is reflected in the average length of stay for those on EM as of September 2021 – among those not marked as AWOL, 50% had spent less than 4.5 months on EM, and only 18% had spent more than 12 months; among those marked as AWOL, 50% had spent at least 2 years on EM, and over 68% had been on EM for over a year (see Figure 2.4).

Figure 2.3: Active EM Population vs. AWOL EM Population
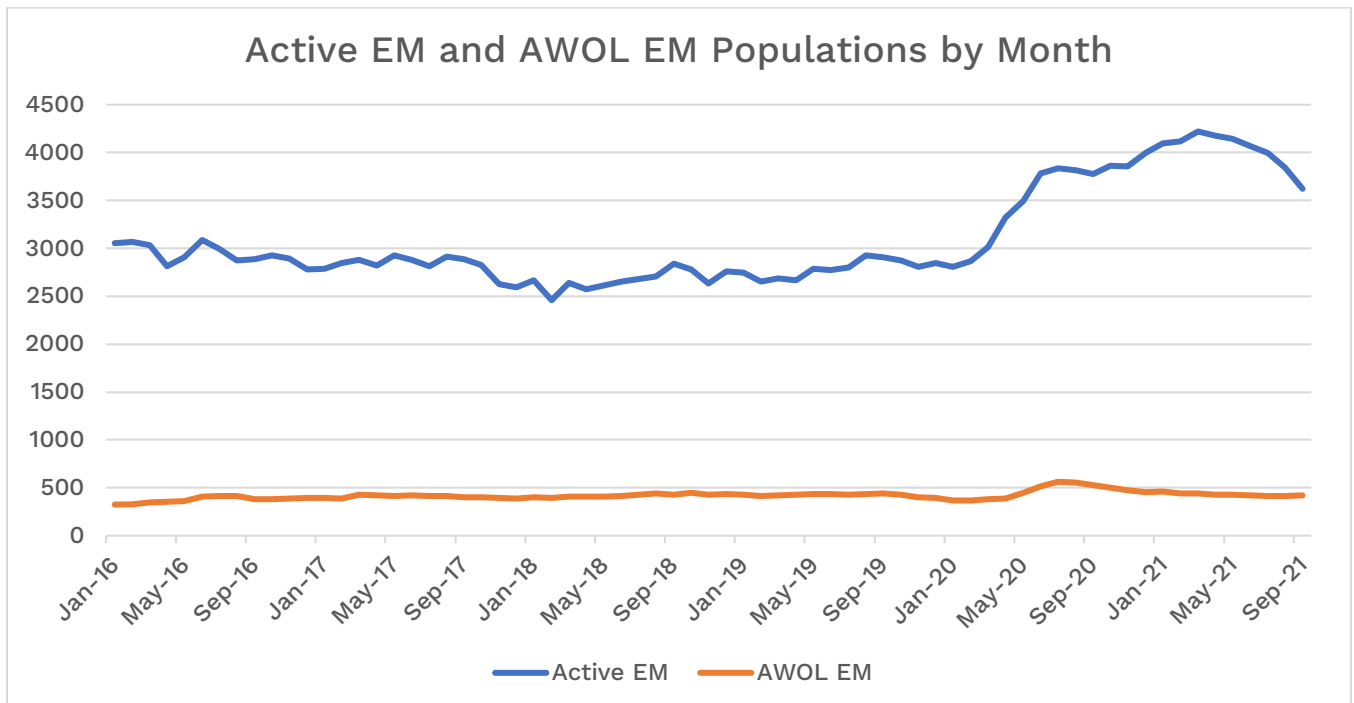
This chart depicts the total number of bookings under CCSO custody over the course of each month that had any time actively on EM or on EM while AWOL. Source: CCSO custody assignment data.

Figure 2.4: AWOL EM Population by Tenure

Time on AWOL	Share	Cumulative
Less than 1 year	31.7%	31.7%
At least 1 but less than 2 years	17.9%	49.6%
At least 2 but less than 3 years	6.7%	56.3%
At least 3 but less than 4 years	4.3%	60.6%
At least 4 but less than 5 years	5.5%	66.1%
At least 5 but less than 6 years	6.0%	72.1%
At least 6 but less than 7 years	4.3%	76.4%
At least 7 but less than 8 years	1.4%	77.8%
At least 8 but less than 9 years	0.5%	78.3%
At least 9 but less than 10 years	0.5%	78.8%
At least 10 years	21.2%	100%

To determine how CCSO AWOL rates compare to other jurisdictions, we examined two studies that try to quantify the "absconding rate" for people on electronic monitoring. For these studies, an individual is declared to be AWOL/absconding if their activities are unmonitored by a device and their location cannot be determined.

A study on home confinement in Florida found the absconding rate on December 30, 2004, was 35%. When following individuals from the start of their placements, 16% of those on home confinement in Florida and 14% of those on pre-trial EM in Indiana would go on to abscond/go AWOL. By comparison, for everyone on EM under the CCSO's jurisdiction between January 2016 and September 2019 (i.e., those we can follow for two years after their initial appearance in CCSO custody), 10% will go on to be flagged as AWOL.

3. Arrests for New Offenses While on EM

In our analysis, we measure the number of incidents that result in an arrest of someone who was on EM at the time of the offense. Note, importantly, that the arrest does not need to occur during the period while the individual is on EM for the arrest to be counted as long as the associated offense was alleged to have occurred during the EM period. For example, we measure 8 homicides that occurred in 2020 and resulted in the arrest of someone who was on EM at the time of the homicide. Note that arrests with a charge listed as attempted homicide are categorized under non-fatal shooting. In addition, we are only able to measure

arrests by CPD, so we compare this number of arrests to the level of underlying victimization in Chicago, rather than Cook County as a whole.

We count incidents towards the years in which they occur, not the year in which they may result in an arrest. For example, if someone is arrested in 2021 for a homicide that occurred in 2020 during a period in which they were on EM, that incident counts towards 2020's total. Moreover, if someone is on EM in August 2016 and is arrested two years later for a homicide that occurred in August 2016, that counts as an EM homicide arrest for 2016. Different decisions about how to "date" these arrests could potentially matter if there were massive swings year-to-year in the number of arrests, but, as shown in Figure 3.1, the number of homicide arrests or non-fatal shooting arrests of people on EM is consistently low relative to the total number of homicides in each year.
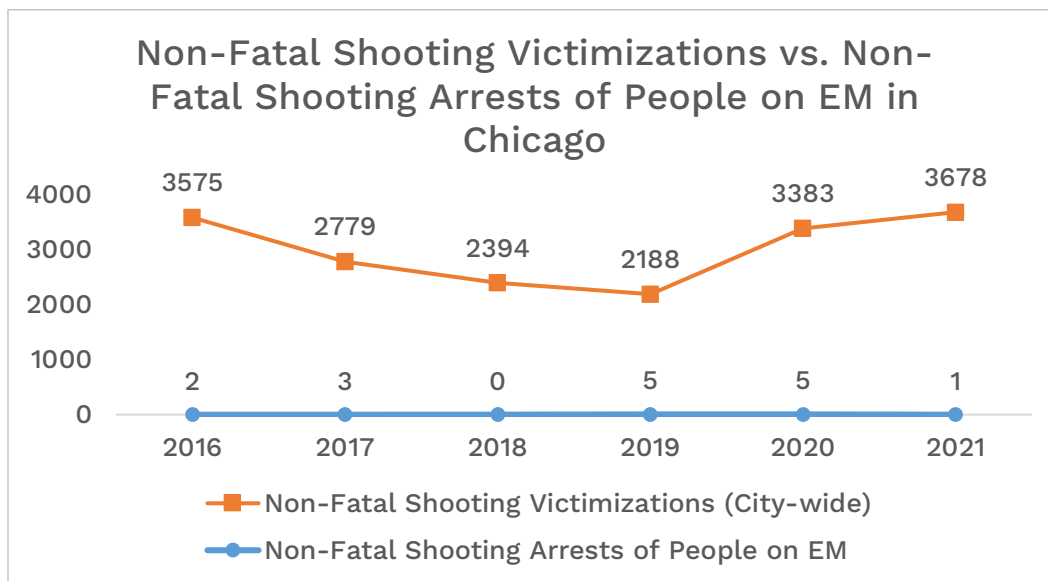
Figure 3.1: Homicide Victimizations vs. Homicide Arrests of People on EM in Chicago
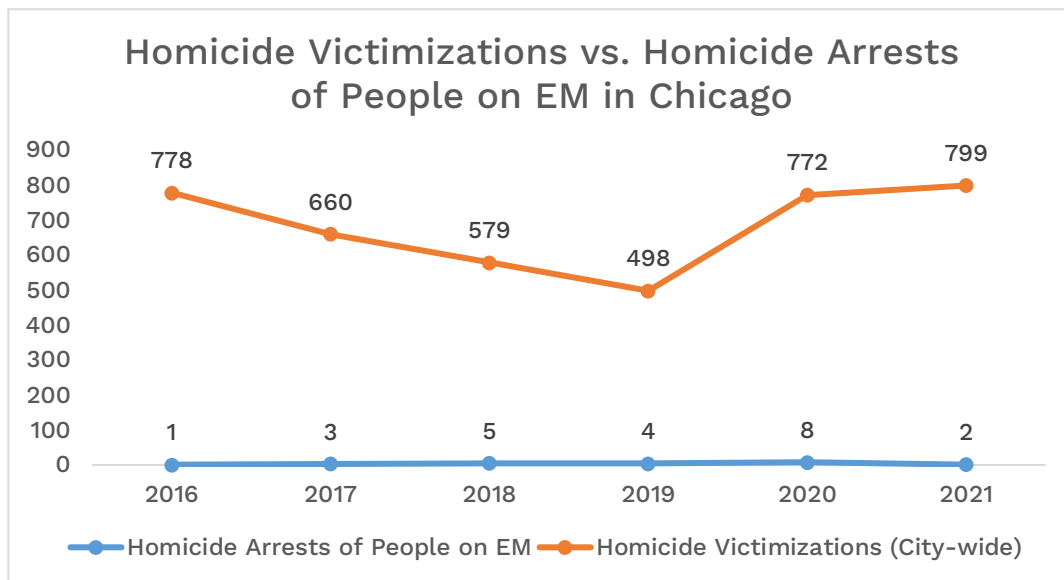
This chart depicts the number of homicide victimizations in Chicago as well as the number of homicide arrests of people who were on EM at the time of the incident. The year is determined by the timing of the incident, not the timing of the arrest. Source: CPD and CCSO data.

Of the 23 people arrested for homicide who were on EM at the time of their offense from 2016-2021, five were listed as AWOL EM at the time of the offense (see previous section for more details).

Figure 3.2: Non-Fatal Shooting Victimizations vs. Non-Fatal Shooting Arrests of People on EM in Chicago

Non-Fatal Shooting Victimizations vs. Non-Fatal Shooting Arrests of People on EM in Chicago

Year	Non-Fatal Shooting Victimizations (City-wide)	Non-Fatal Shooting Arrests of People on EM
2016	3575	2
2017	2779	3
2018	2394	0
2019	2188	5
2020	3383	5
2021	3678	1

This chart depicts the number of non-fatal shooting victimizations in Chicago as well as the number of non-fatal shooting arrests of people who were on EM at the time of the incident. The year is determined by the timing of the incident, not the timing of the arrest. Source: CPD and CCSO data.

Of the 16 people arrested for non-fatal shooting who were on EM at the time of their offense from 2016-2021, two were listed as AWOL EM at the time of the offense (see previous section for more details).

4. CAUSE OF ARREST FOR PEOPLE ON EM

People can be arrested and charged with multiple offenses. We follow the convention of the FBI's Uniform Crime Reporting system (and most criminology research) by categorizing the crime for which someone on EM was put on EM as their most serious or top initial arrest charge (the first charge listed for each person). When we say "the number of people on EM for homicide," we mean the number of people on EM for whom their top initial arrest charge was homicide. In Figure 4.1, we define the various arrest categories used in Figures 4.2, 4.3, and 4.4; all categories are mutually exclusive.

Figure 4.1: Definitions of Arrest Categories

|	
Homicide/Shooting	Homicides, attempted homicides, non-fatal shootings; a small share of this category is accounted for by manslaughter and reckless homicide as categorized under FBI Code 01B
Other Violent	Sexual assault, robbery, aggravated assault, aggravated battery, simple assault, simple battery
Other: Gun Possession	Unauthorized Use of a Weapon and other gun offenses (e.g., concealed carry without a license, reckless discharge, possession of a stolen firearm).
Other: Felony	All other offenses that are classified as a felony under Illinois state law (e.g., burglary, DUI, home invasion)
Other: Misdemeanor	All other offenses that are classified as a misdemeanor under Illinois state law (e.g., criminal trespass, disorderly conduct)
Has No Matching CPD Record	All cases for which we cannot find a matching CPD arrest during the 5 days leading into the initial booking. Our assumption is that these are cases that originated outside of Chicago but within Cook County. This trendline is eliminated from the article itself but is included in Figures 4.2, 4.3, and 4.4 below.
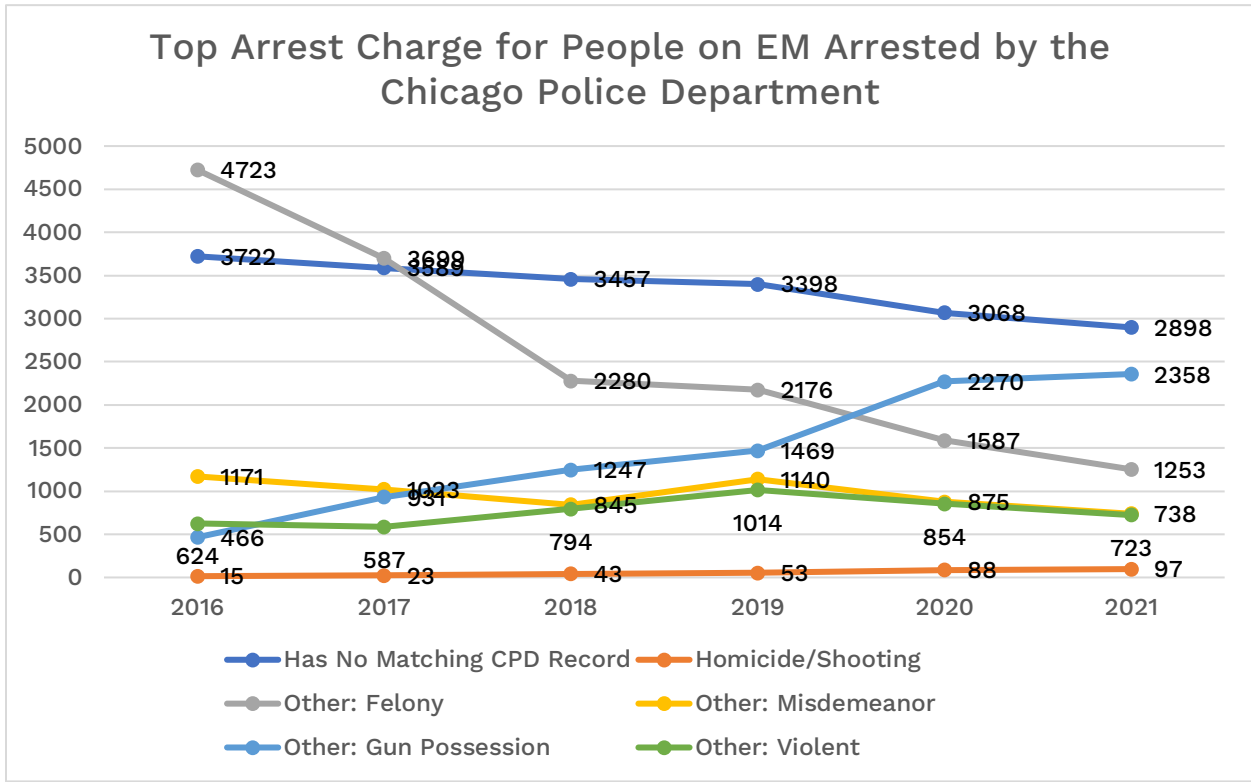
This chart depicts the distribution of top charges among people on EM for at least one day in a given calendar year. Source: CCSO and CPD data.

Figure 4.2 defines the number of people on EM for a given offense as the total number of unique bookings that are assigned to EM for at least one day in a given calendar year with an initial booking charge matching that offense. For example, if someone is on EM from August 2018 until March 2019 due to an initial arrest charge of homicide, they would be included in the "homicide/shooting" totals for both 2018 and 2019. This means that adding up each of the counts for people on EM across charge categories in a particular year will not necessarily yield a total that is identical to the end of year totals in Figure 2.1 for that year. Note that for 2021, because of where our data ends, a "calendar year" is January 2021 – September 2021.

Another way to figure out how common EM is for each offense is to look at each offense category's share of the total EM bookings:

Figure 4.3: Top Arrest Charge for People on EM (Share of Total Bookings)
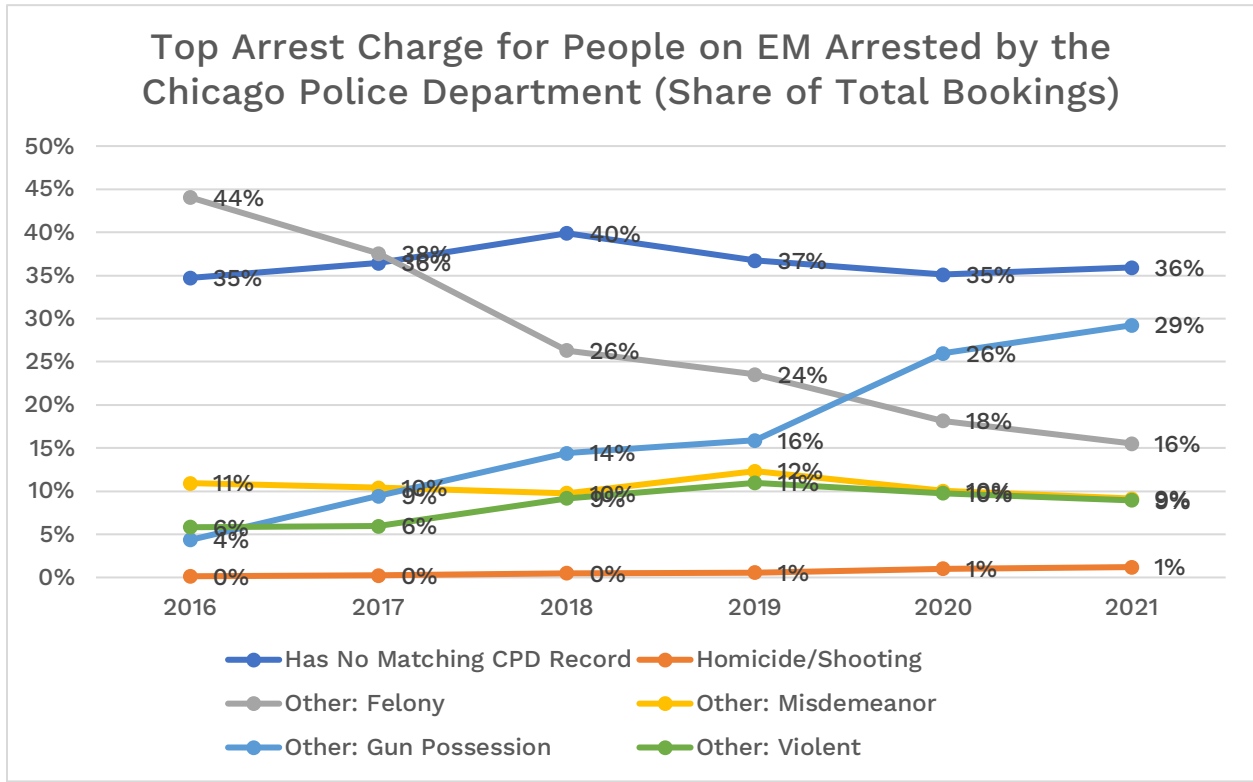
This chart depicts the distribution of top charges among people on EM for at least one day in a given calendar year expressed as a percentage of the total number of bookings in a given calendar year. Source: CCSO and CPD data.

Because jail "flow" is so much higher than jail population on a given day, looking at the number of people on EM for at least one day may give more weight to offenses that are more common and/or have shorter associated jail stays. An alternative definition is simply a "snapshot" of the EM population on a specific date. Below, we present the top arrest charge for people on EM at the end of each year (December 31 for 2016-2020 and September 30 for 2021):

Figure 4.4: Top Arrest Charge for People on EM (End of Year)

Top Arrest Charge for People on EM Arrested by the Chicago Police Department (End of Year)
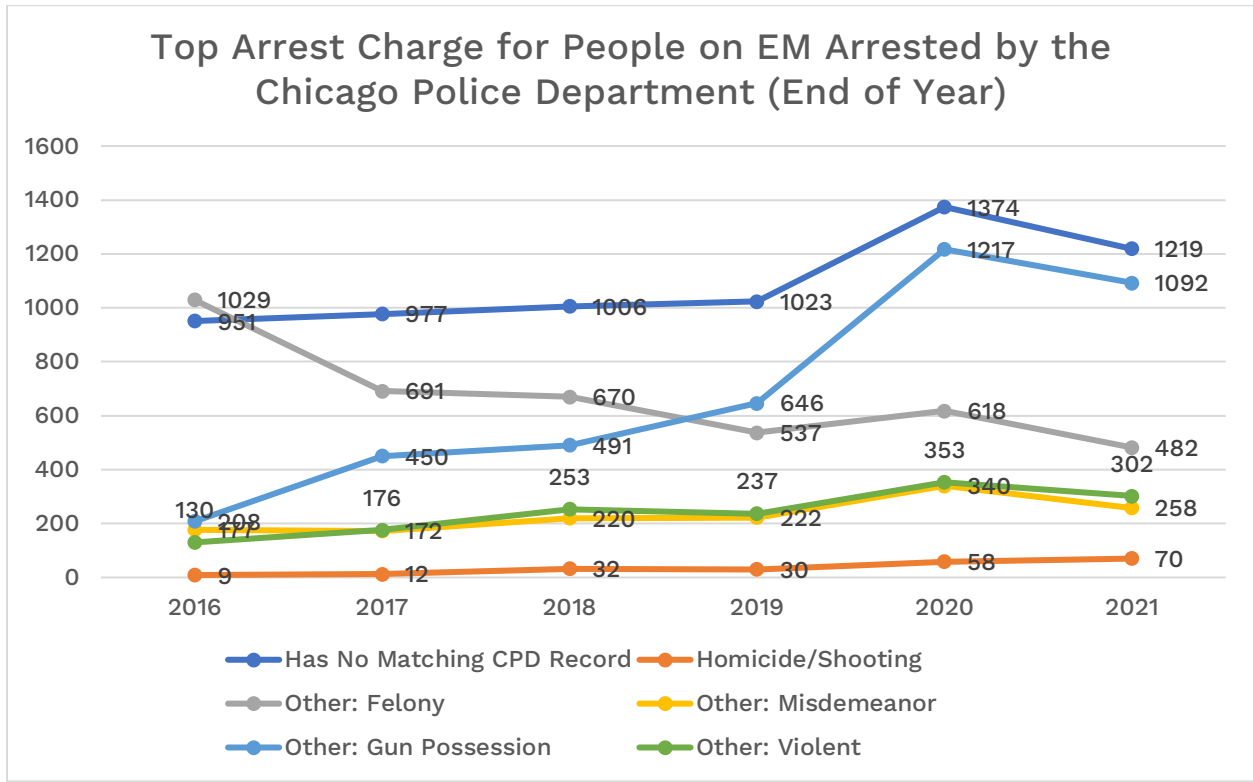
This chart depicts the distribution of top charges among people on EM as of the end of the calendar year (December 31 for 2016-2020 and September 30 for 2021). Source: CCSO and CPD data.

5. ARRESTS AND BOOKINGS

This section compares trends in arrests and jail bookings over time, where arrests reflect the number of people who *could* be eventually held in jail, and jail bookings reflect the number of individuals who *are* held in custody (note that jail custody excludes EM). In the charts that follow, we measure arrests over the period leading into a given point in time, whereas we measure bookings in one of two ways: 1) over the same period as arrests, and 2) as a snapshot at the end of the period. For example, a three-month period measured at March 2016 would include all bookings from January, February, and March 2016 in the "over time" measure, but only those bookings that are still active on March 31st, 2016 in the "given point in time" measure. Note that we start looking at custody data in January 2016, so the first data point for charts showing a particular measure over the preceding three (six) months will be March (June) 2016.

We present both versions of the booking measure because each might be informative in different ways. The snapshot measure gives a sense of the total population in CCSO jail custody at any one time, whereas the over-time measure gives a sense of the flow in and out of the jail. These measures are a function of a variety of factors, from the number of people arrested to judges' decisions about either holding defendants in jail or releasing them on EM and/or bond to the length of time it takes for a defendant's case to be resolved. We encourage caution in interpreting these data because these factors might move in opposite directions at the same time. For instance, if judges release more individuals on bond but existing cases take longer to resolve, the total population in the jail might not change on balance.

Figure 5.1: Arrests (Past Three Months):
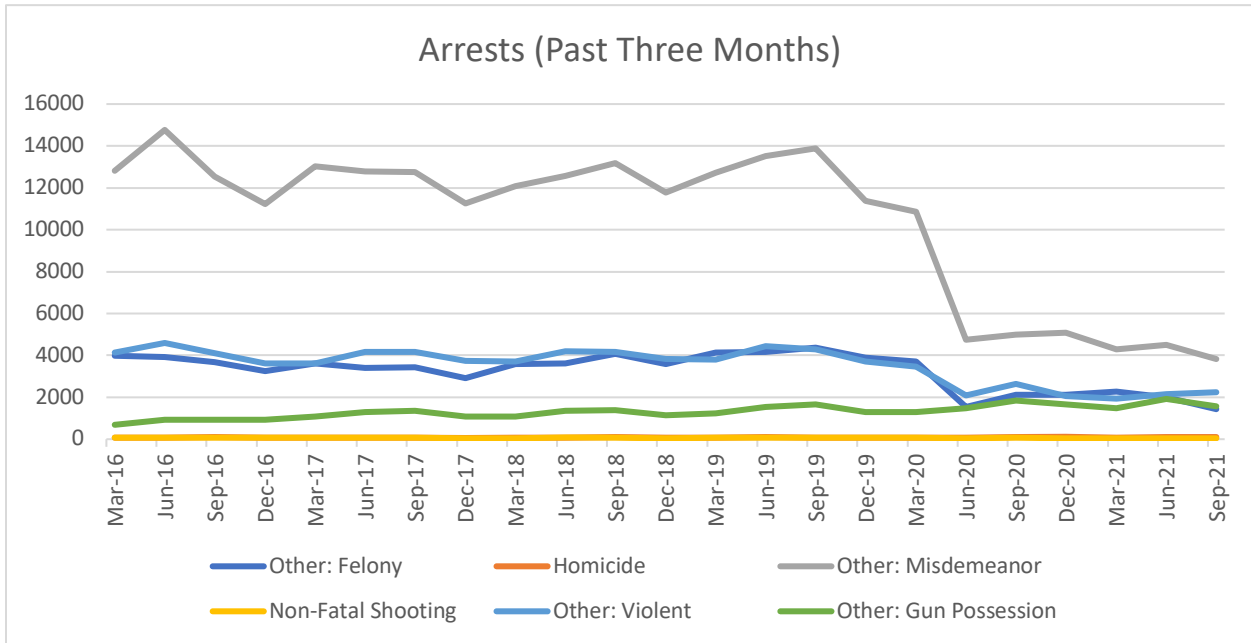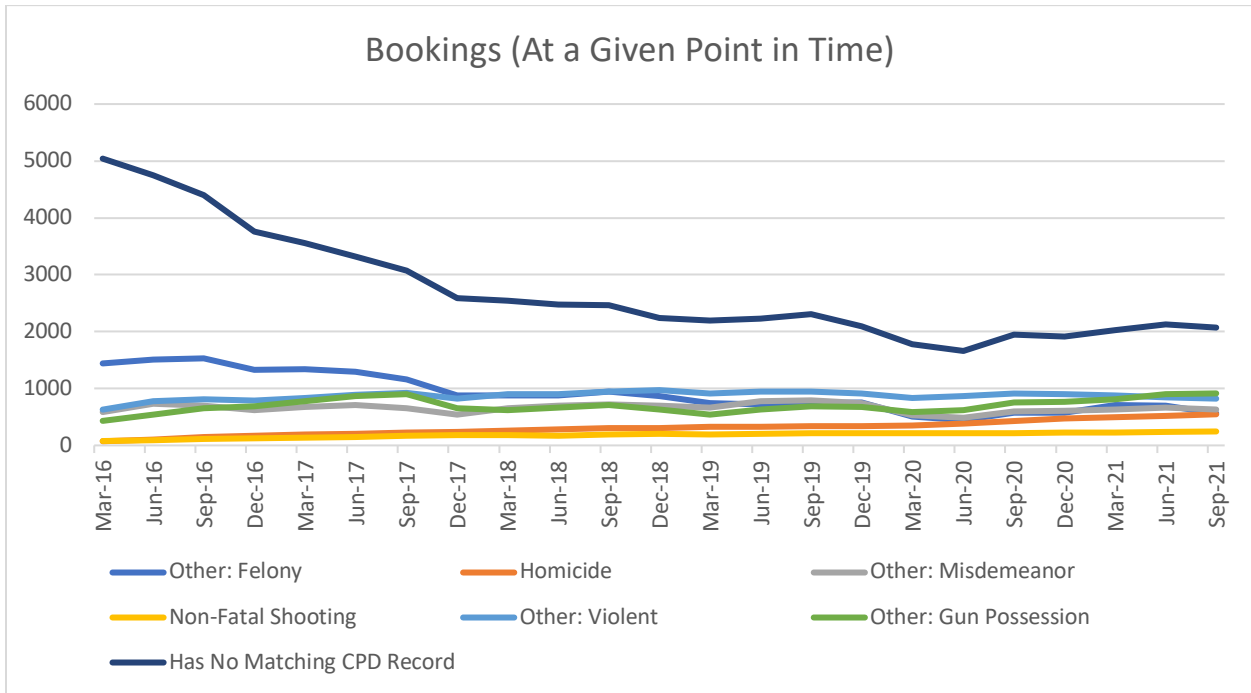

Arrests (Past Three Months)

This chart depicts the total number of arrests for a given offense over the preceding three months. Source: CPD data.

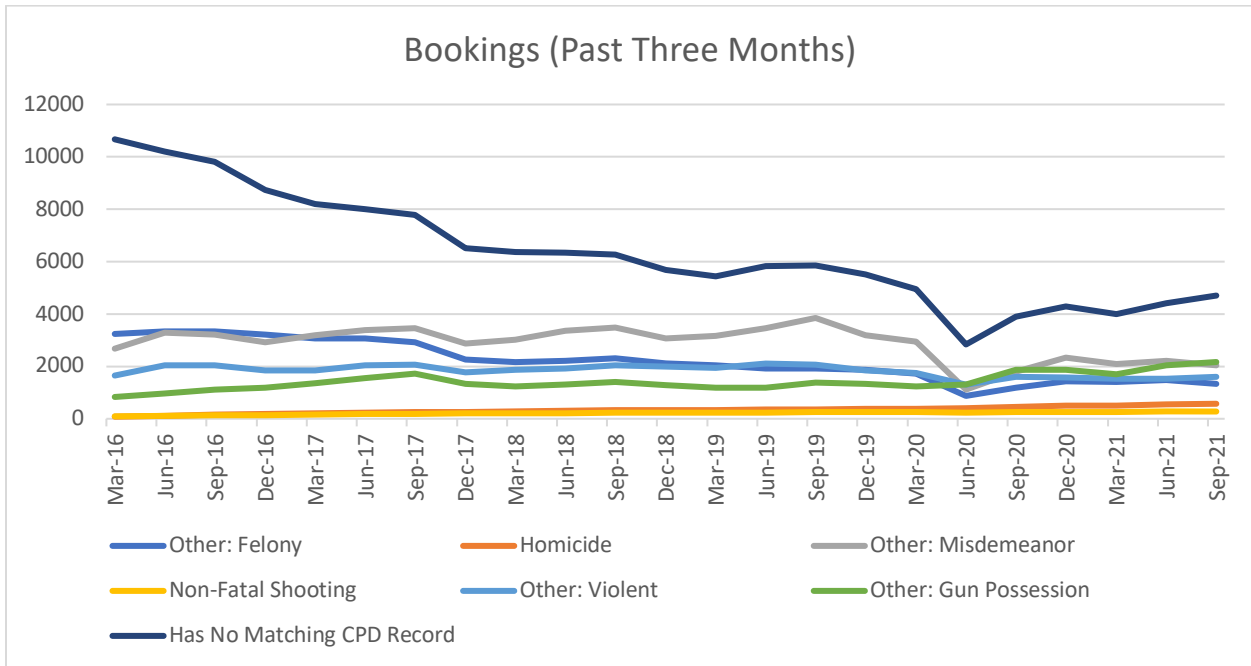*Figure 5.2: Arrests (Past Six Months)*
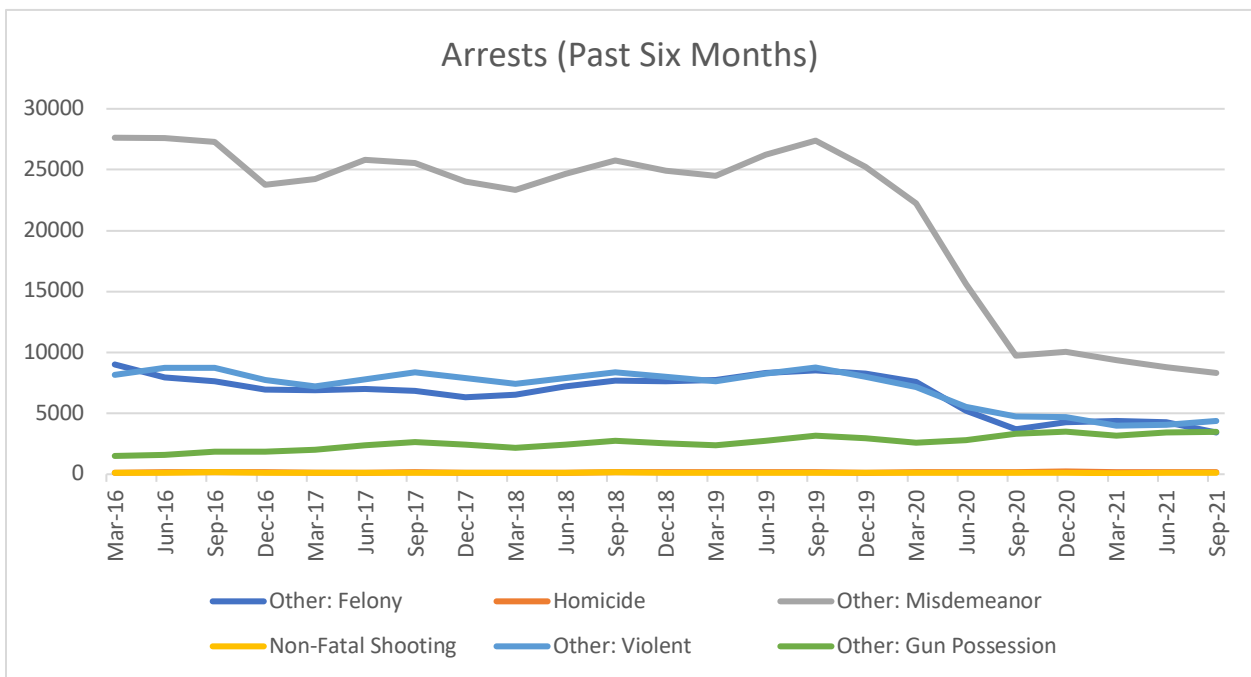
Arrests (Past Six Months)

This chart depicts the total number of arrests for a given offense over the preceding six months. Source: CPD data.
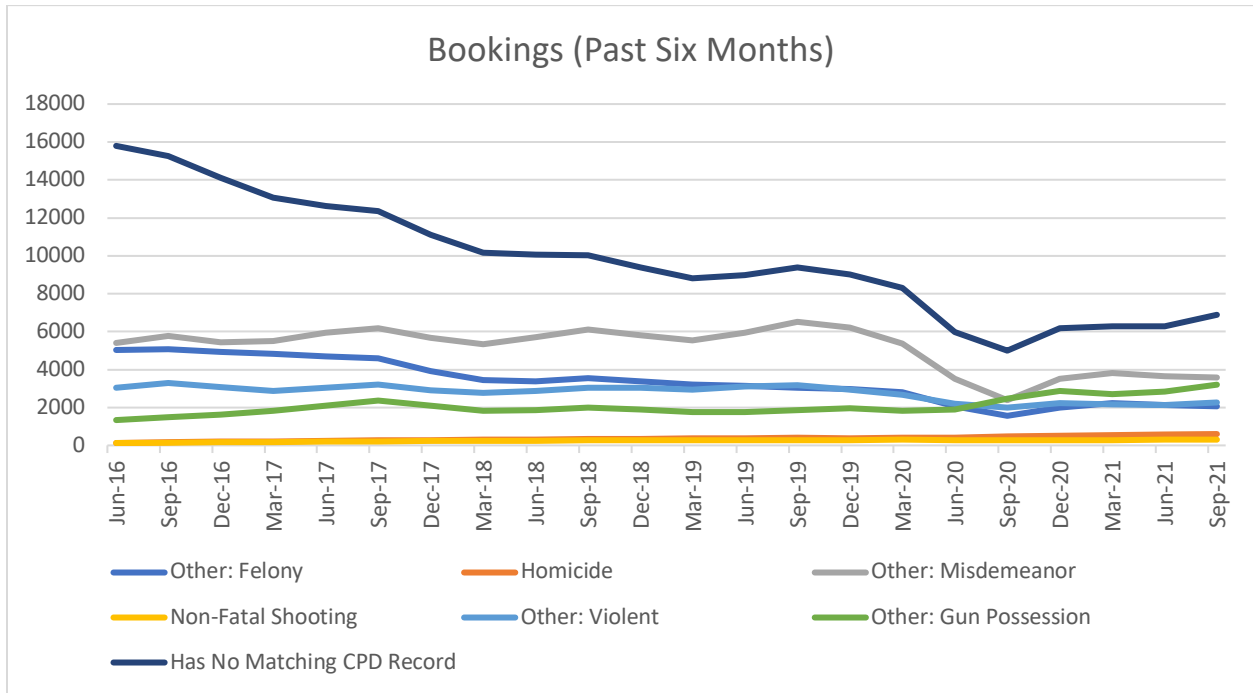
Figure 5.3: Bookings (At a Given Point in Time)

This chart depicts the total number of bookings for a given offense on a particular date. Source: CCSO and CPD data.

Figure 5.4: Bookings (Past Three Months)

This chart depicts the total number of bookings for a given offense over the preceding three months. Source: CCSO and CPD data.

Figure 5.5: Bookings (Past Six Months)

This chart depicts the total number of bookings for a given offense over the preceding six months.
Source: CCSO and CPD data.

6. JAIL-ARRESTS RATIO

Looking at trends in the jail population alone may miss changes in the probability that someone arrested for a given type of crime goes to jail, because (as we have seen in recent years in particular) there can be large year-to-year changes in the number of crimes and arrests for different offense categories. Ideally, we'd like to measure the likelihood someone who is arrested for each offense category winds up in jail by looking at pre-trial, charging, and conviction data for each arrest. To do that, we'd need court data, to which we unfortunately don't have access.
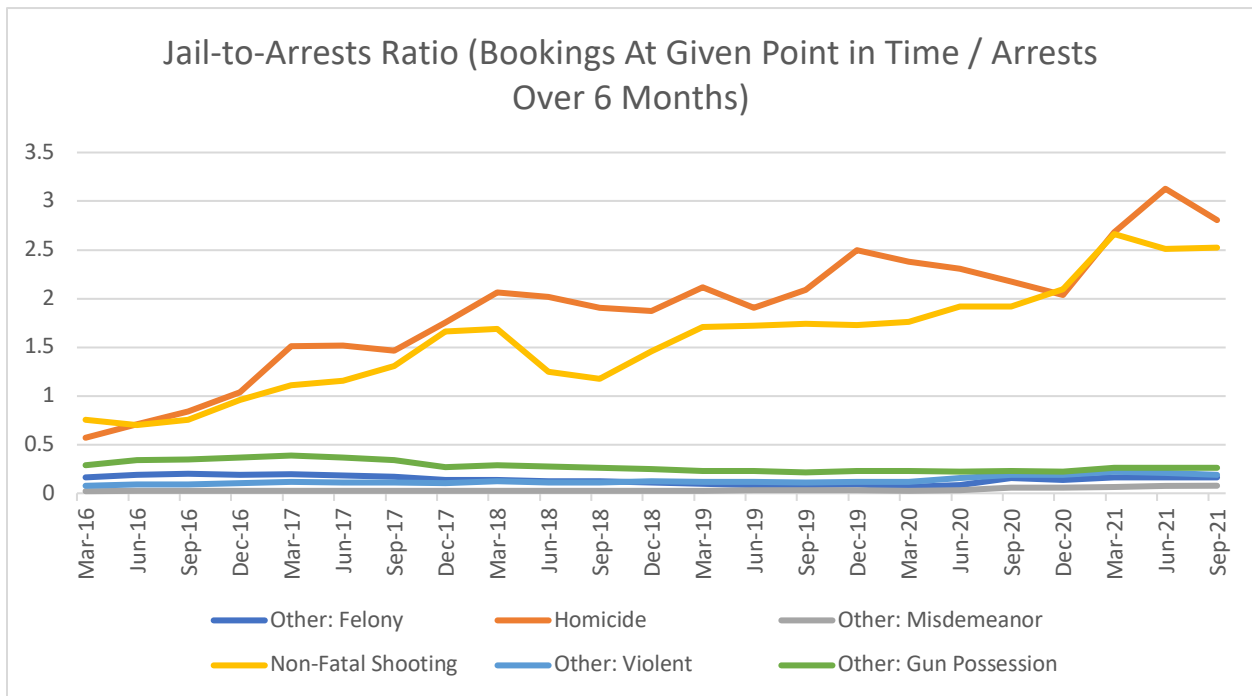
Instead, we approximate this likelihood using the ratio of people in jail to arrests for each offense category over a fixed time period:

$$\frac{number\ of\ bookings\ for\ a\ given\ offense\ at\ a\ given\ point\ in\ time}{total\ arrests\ for\ a\ given\ offense\ over\ the\ prior\ six\ months}$$

This measure isn't perfect because it captures both a) the probability of going to jail for a given offense, as well as b) the time that it takes to resolve these types of cases, which can vary over time due to, for instance, changes in how prosecutors

resolve plea deals or pandemic-induced slowdowns in courts. The more time it takes to resolve a case, the larger the number of bookings in CCSO custody at any given time. To address this concern, we also analyze how the lengths of jail time for each offense type have changed over time (see Section III.7).

Figure 6.1: Jail-to-Arrests Ratio (Bookings at Given Point in Time / Arrests Over 6 Months)

Jail-to-Arrests Ratio (Bookings At Given Point in Time / Arrests Over 6 Months)

Legend: Other: Felony, Homicide, Other: Misdemeanor, Non-Fatal Shooting, Other: Violent, Other: Gun Possession
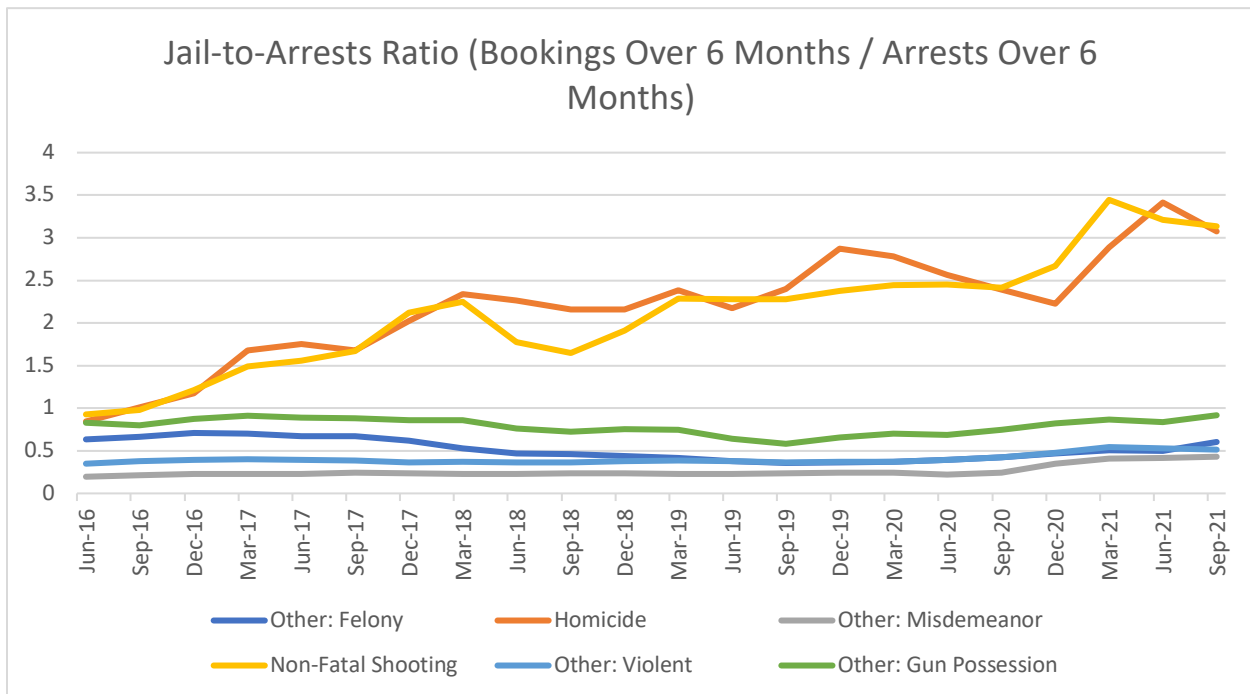
This chart depicts the jail-arrests ratio, defined here as the number of bookings at a given point in time divided by the number of total arrests over the prior six months. Source: CPD and CCSO data.

Because the number of active bookings at any given point in time will include both 1) people who were arrested in the preceding days and 2) people who were arrested in previous months (or years) without (as yet) any case resolution, the arrest denominator in our ratio is measured over the six-month period leading up to the "snapshot" date to best capture the arrests of the people included in the numerator.

Bookings are measured at a particular point in time, rather than measuring both bookings and arrests over the past six months, to avoid double counting people who appear in CCSO custody multiple times over that period. However, we present a version of the jail-arrests ratio with both components measured over a 6-month span below, which shows very little difference in the trends compared to Figure 6.1:

Figure 6.2: Jail-Arrests Ratio (Bookings Over 6 Months / Arrests Over 6 Months)

This chart depicts the jail-arrests ratio, defined here as the number of bookings over the prior six months divided by the number of total arrests over the prior six months. Source: CPD and CCSO data.

7. BOOKING DURATION

Booking duration approximates the time someone has experienced with an open case so far, (that is, before case resolution). It is defined as the length of time since the booking date for each person currently in jail at a given point in time. More specifically, for a given snapshot date (e.g., June 30th, 2019), the booking duration equals that snapshot date minus the date the person was booked. For someone who was first booked on June 1st, their current duration on June 30th would be 29 days. We only capture a booking duration for people who are actively in CCSO custody in jail on the snapshot date.

Note that duration is not exactly the same as time spent in jail because someone may have been released on bond or on EM for some amount of time during the booking. For example, they may have been booked at the beginning of the month, been released on bond for two weeks, and returned to custody in time to show up in jail for the June 30th snapshot.

In the charts below, we show the median booking duration for a given offense at the end of each quarter. Figure 7.1 is identical to the figure in the article but includes additional charge categories.
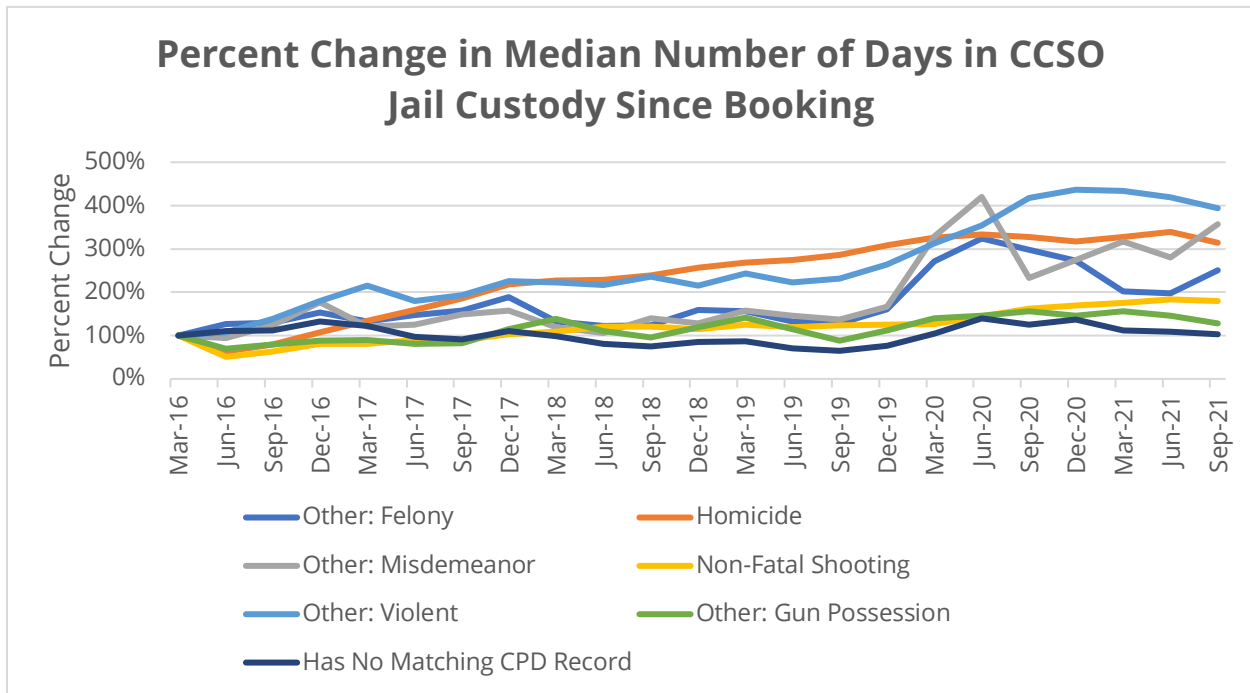
Figure 7.1: Booking Duration (Median)

This chart depicts the median booking duration for each offense category over the past quarter.
Source: CCSO and CPD data.

It's also informative to examine how median booking duration has changed over time relative to the start of our data:

Figure 7.2: Booking Duration (Percent Change Since First Quarter 2016)

This chart depicts the percentage change in the median booking duration for each offense category at a given quarter relative to the median duration of bookings for the same offense category at the end of the first quarter of 2016. Source: CCSO and CPD data.

8. VICTIMIZATION OF PEOPLE ON EM

To compute the rate of homicide victimization for people on EM, we combine two statistics. First, we measure the total number of homicide victimizations among the EM population in a given year. Second, we measure the total number of days spent on EM during that year across the entire EM population (both those victimized and those who are not victimized). For example, consider someone who is on EM from August 2018 to March 2019. That person would contribute about 150 days (5 months) to the "total number of days on EM" statistic in 2018 and about 90 days (3 months) to the "total number of days on EM" statistic in 2019.

Using the number of victimizations and the "total number of days on EM" statistic, we compute the rate of homicide victimizations per day on EM:

$$\frac{Total\ number\ of\ homicide\ victimization\ among\ people\ on\ EM\ in\ a\ given\ year}{Total\ number\ of\ days\ spent\ on\ EM\ by\ everyone\ on\ EM\ during\ the\ year}$$

Because rates of violence are conventionally measured in terms of victimizations per 100,000 people, we annualize and scale this rate so that it can also be interpreted in terms of victimizations per 100,000 people per year. This adjustment can be shown as:

$$\frac{(Total\ number\ of\ homicide\ victimizations\ among\ people\ on\ EM\ in\ a\ given\ year)*365*100{,}000}{Total\ number\ of\ days\ spent\ on\ EM\ by\ everyone\ on\ EM\ during\ the\ year}$$

We exclude people with no matching CPD arrest at the time of their booking from this calculation because, even if they were victimized, they would be unlikely to show up in CPD victimization data because they are likely based elsewhere in Cook County, outside of Chicago.

In the chart below, we present the homicide victimization rates of a number of comparison groups: all residents of the city of Chicago, young men in the city of Chicago, young men in high-violence neighborhoods of Chicago, and men in the control group of the evaluation of the READI Chicago violence intervention—a group identified to be at particularly high risk of violence involvement. To ensure comparability, all rates are annualized across the period for which READI was evaluated (and thus the period for which we have data on the control group's victimizations): August 2017 - November 2021. Annualized rates represent the average level of victimization during this period, scaled to reflect a 12-month period. We also include for comparison the cumulative death rate from COVID-19 across the United States.

Figure 8.1: Homicide Victimization Rate per 100,000, Annualized
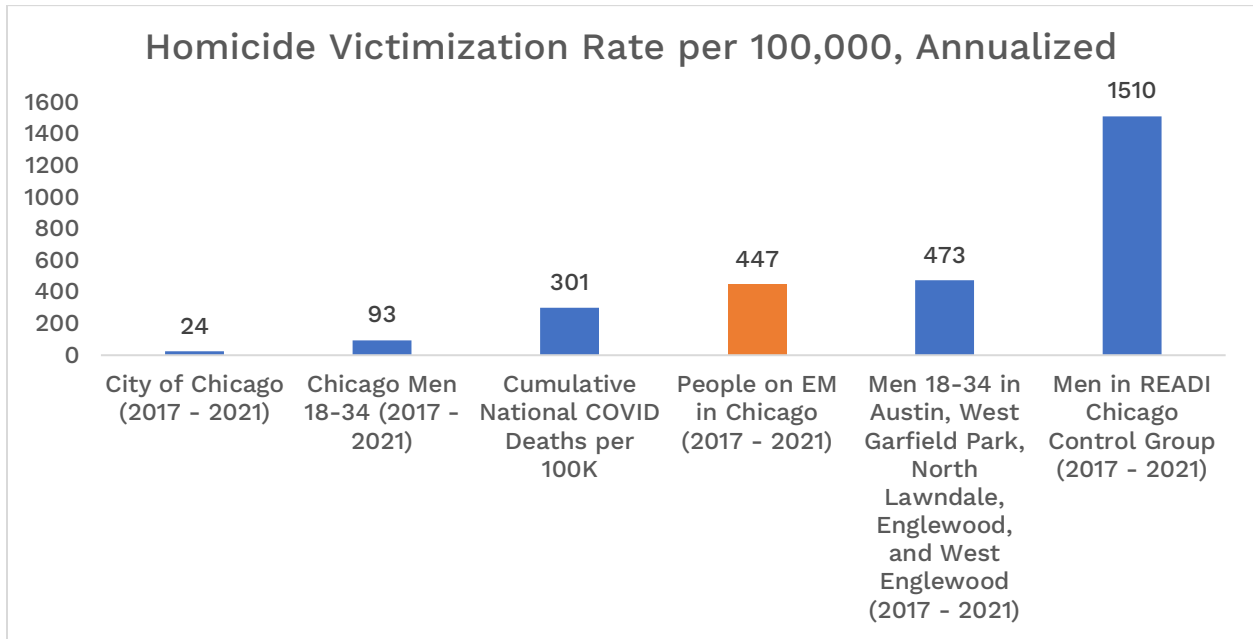
This chart depicts the annualized homicide rate for the city of Chicago from 2017-2021; the annualized homicide victimization rate for men in Chicago ages 18-34 from 2017-2021; the annualized homicide rate for people on EM in Chicago from 2017-2021; the annualized homicide rate for men ages 18-34 in the Chicago community areas of Austin, West Garfield Park, North Lawndale, Englewood, and West Englewood from August 2017 - November 2021; the annualized homicide rate for men in the READI Chicago control group, a group identified to be at the highest risk of violence involvement (more information here), during the READI program's evaluation period from 2017-2021; and the cumulative death rate from COVID-19 across the United States. Sources: Cook County Sheriff's Office, Chicago Police Department, READI Chicago, Johns Hopkins University.