SUPPLEMENTAL MATERIALS

"How the Pandemic is Accelerating Carjackings in Chicago"

Chicago Tribune Data Points column, June 20, 2021

In 2020, Chicago saw more carjackings than in the previous two years combined. In our June Data Points column in the Chicago Tribune, we explore what is behind the recent surge. One much discussed (and debated) argument is that young people, teens particularly, are driving the increase. Taken together, evidence from carjacking arrest data, victim estimates of suspect age, clearance rates, and arrest trends in other cities indicate that increased youth involvement is driving the uptick in carjackings. This growing youth involvement suggests that the pandemic may be contributing to the rise in carjackings but not as a result of what many in the public might have assumed -- economic dislocation. We see in the data, for example, that youth involved in carjacking are more likely to live in areas with lower internet access and school attendance, especially during the pandemic. We also show that Chicago is currently missing many potential contact points with these youth that could be used to, for instance, connect them to social services at a time when they need them most.

In any data analysis, there are many detailed decisions to make due to uncertainties or intrinsic limitations to the data themselves, as well as reasonable alternative choices about how to analyze and present the results. Because of limited space in the Datapoints column, we have omitted many of those details and sensitivity analyses from the published version. We provide those additional details here.

Definition of carjacking and vehicular hijacking
We use the colloquial "carjacking" and the more technical "vehicular hijacking" interchangeably. These both refer to all events with IUCR code 0325 (Vehicular Hijacking) or 0326 (Aggravated Vehicular Hijacking). Some people have observed that "carjacking" itself can be a normatively loaded term. After some deliberation, we have decided to use the term in part for clarity in communication since it is already in widespread use in the public discourse.

Definition of youth
Throughout our analysis, "youth" refers to people aged 17 and under.

Incident level vs. suspect level data
Vehicle hijackings often involve more than one participant; as a result, there are also often multiple suspects or arrestees for each hijacking incident.

Data examined at the *suspect level* uses all suspects associated with a vehicle hijacking event as the unit of analysis. For example, suppose there were a carjacking incident that

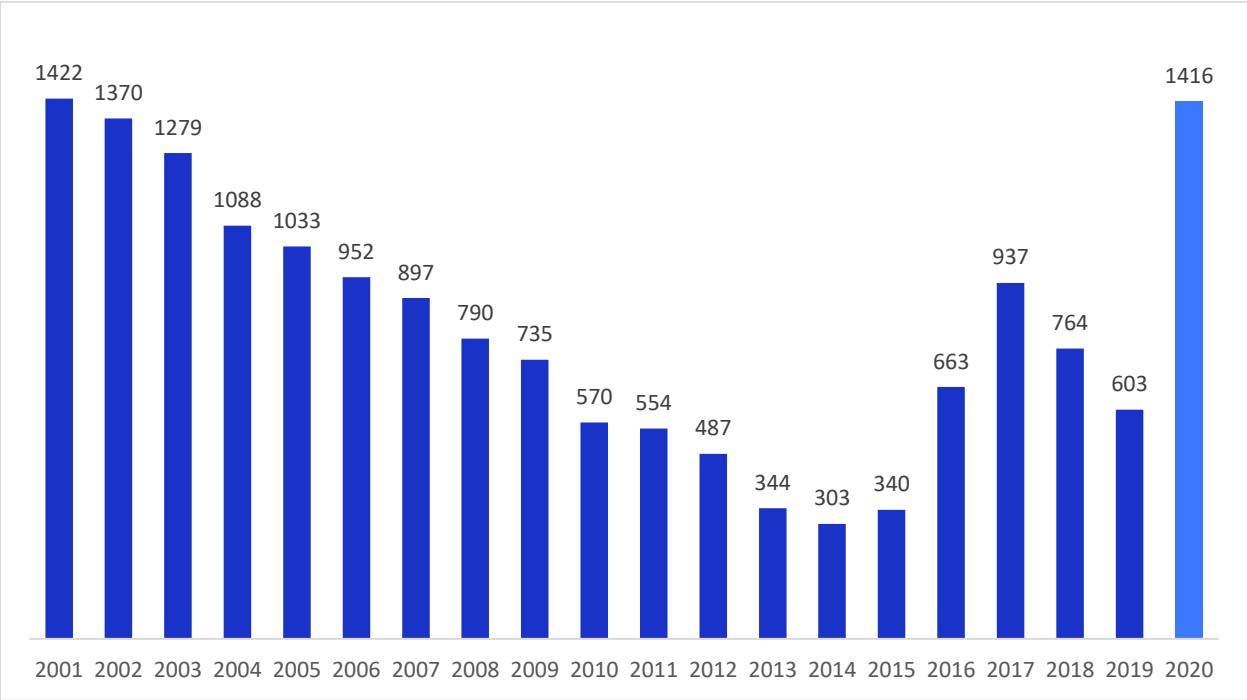
involved one 15-year-old suspect and one 25-year-old suspect. Each suspect would count as an individual observation (if we imagine the dataset as an Excel spreadsheet, this incident would have two rows, one for each suspect). If both suspects were arrested, the number of adult arrests increases by one as does the number of youth arrests.

On the other hand, data examined at the *incident level* uses a given vehicle hijacking *event* as the unit of analysis. Because we are interested in youth involvement, for analysis conducted at the incident level, we use the *youngest* suspect associated with each incident (for example, to calculate what share of carjackings involve at least one suspect that is under age 18). To use the same illustrative example as above, even if both the 15-year-old suspect and the 25-year-old suspect were arrested, the youngest suspect is under 18 so this incident would count as a youth arrest incident.

In the notes below, we identify which analyses are at the suspect level and which are at the incident level. To show to what degree the results are sensitive to the unit of analysis (or other reasonable analysis decisions), we show what happens if the methodology is changed from one reasonable approach to another.

1. Incidents Over Time

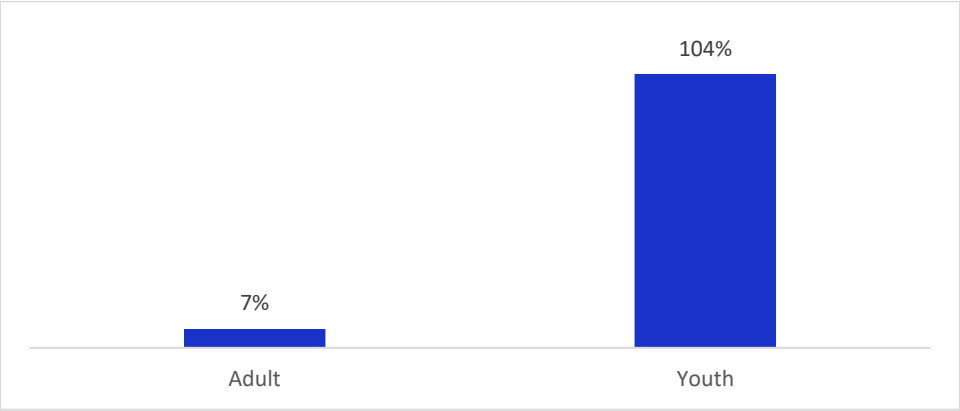
Figure 1: Citywide Vehicular Hijacking Incidents



This chart depicts the number of vehicular hijacking incidents recorded in Chicago in a given year. Source: CPD data.

2. Percent Change in Arrests

Figure 2.1: Percent Change in Carjacking Arrests 2019-2020 at the Suspect Level

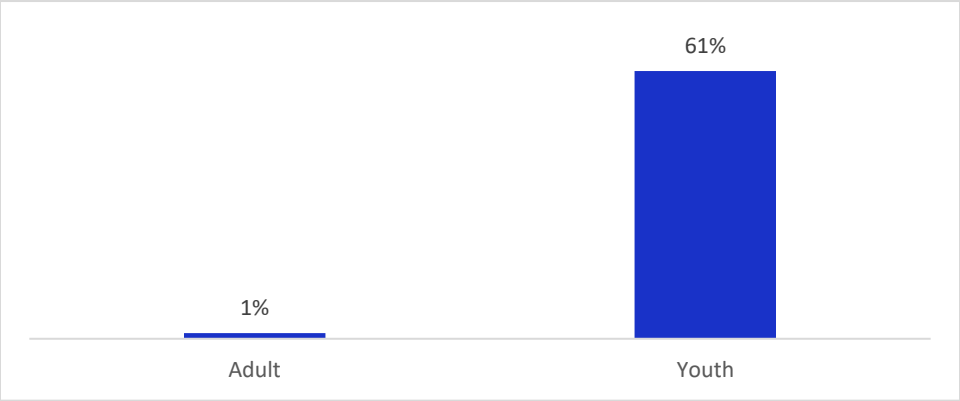


This chart depicts the percentage change in adult arrests and youth arrests between 2019 and 2020 (suspect level). Source: CPD data.

As this data is at the suspect level, the sample is all suspects from all vehicular hijackings. If there are multiple suspects for a single carjacking incident, each suspect is included separately as their own observation.

An alternate way to analyze the same data is to make the unit of analysis the vehicle hijacking incident itself. Below, we present the percent change in carjacking arrests by the age of the youngest arrestee associated with each incident. The results are qualitatively similar:

Figure 2.2: Percent Change in Carjacking Arrests 2019-2020 at the Incident Level



This chart depicts the percentage change in adult arrests and youth arrests between 2019 and 2020 (incident level). Source: CPD data.

3. Clearance Rates

For the purposes of the column, we calculate clearance rates using the following formula:

Equation 1

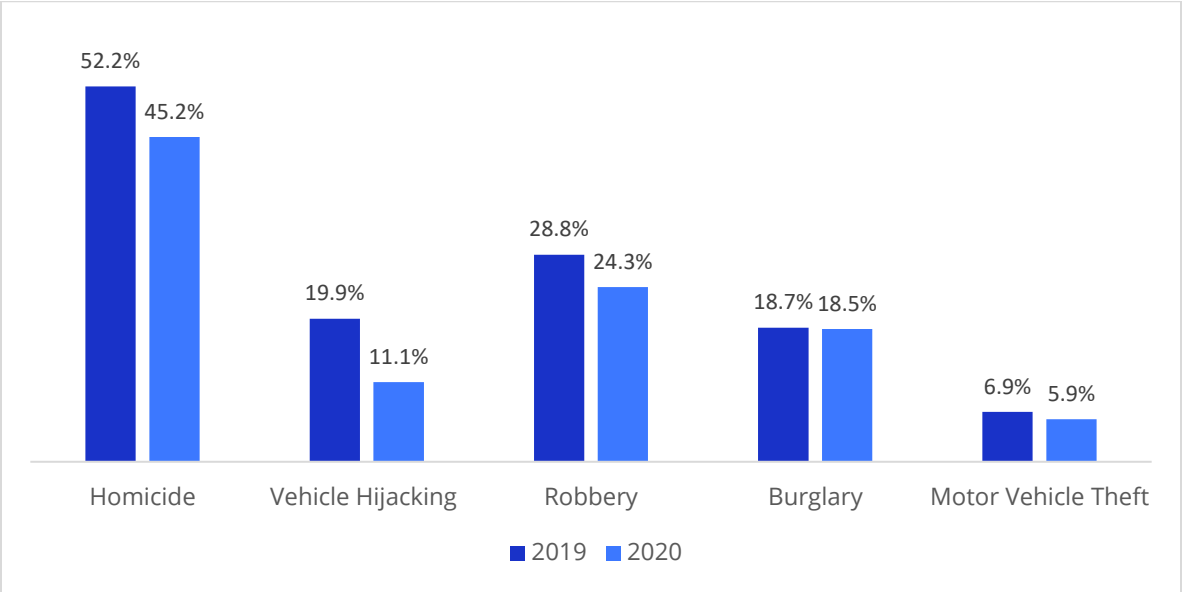
$$\frac{offenses\ cleared\ in\ year\ t}{offenses\ in\ year\ t}$$

There are several ways to determine whether a crime has been cleared:

1. All cases resulting in either an arrest *or* an "exceptional clearance" associated with the incident, regardless of whether charges have been approved by the State's Attorney's Office (SAO). Exceptional clearances are instances in which the police believe they have the evidence to make an arrest but are prevented from doing so by exceptional circumstances (for example, the suspect has died or the assistant attorneys general determine that the case is not strong enough for resources to be invested).
2. All cases resulting in an arrest, regardless of whether the charges have been approved by the SAO, but excluding exceptional clearances
3. All cases resulting in arrest *and* charges that have been approved by the SAO

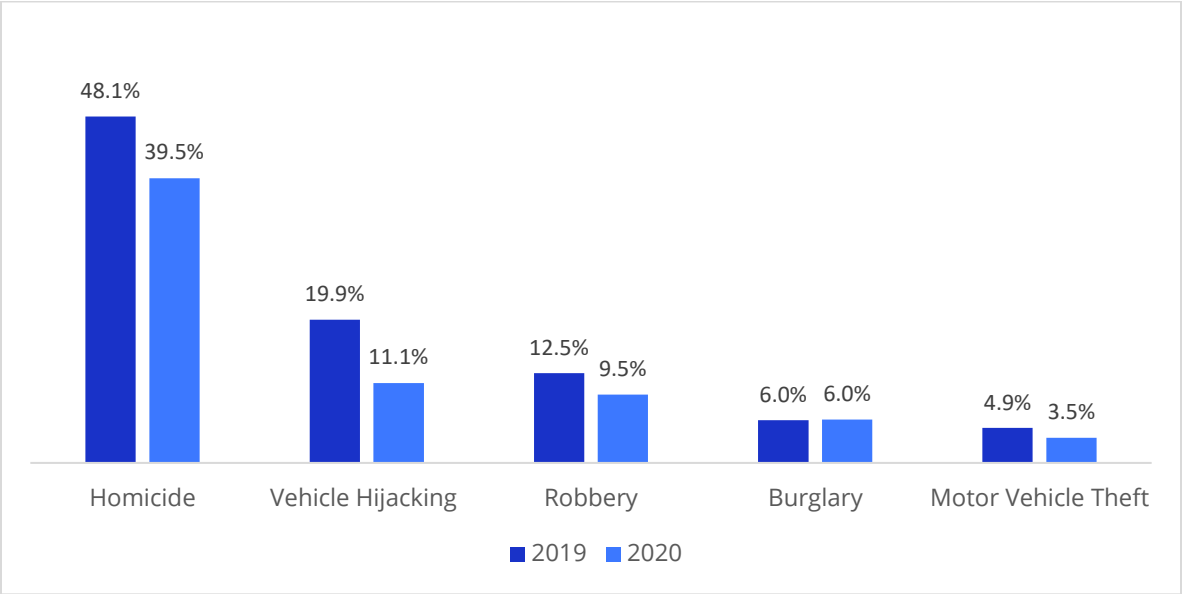
Below, we present the clearance rates under each of these possible formulations:

Figure 3.1: Clearance Rates (Arrest or Exceptional Clearance)



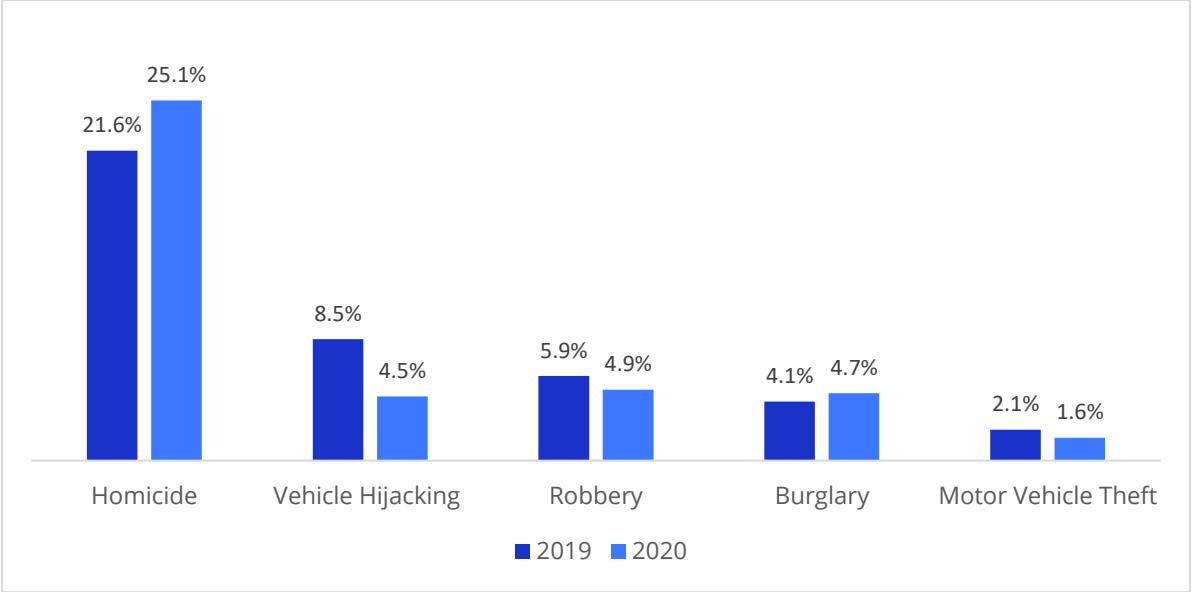
This chart depicts the percentage of the instances of each offense that were cleared by arrest or by an exceptional clearance. Source: CPD data.

Figure 3.2: Clearance Rates (Arrest)



This chart depicts the percentage of the instances of each offense that were cleared by arrest. Source: CPD data.

Figure 3.3: Clearance Rates (Arrest and SAO Charges Approved)



This chart depicts the percentage of the instances of each offense that were cleared by arrest and for which the arrest charges were approved by the State Attorney's Office. Source: CPD data.

Note that because there are times when victims will report a crime in one year that is not cleared until the next year or later, the offenses considered cleared in a given year (and therefore included in the numerator of Equation 1) are not always the same offenses

reported that year (and therefore included in the denominator of Equation 1). As an illustration, suppose a homicide is reported in December 2019 but the suspect is not arrested until May 2020. The reported homicide would be included in the denominator for the 2019 clearance rate, but the associated arrest would not be included in the numerator for the clearance rate for 2019. The arrest for this event that was made in 2020 would be included in the numerator for the 2020 clearance rate calculation but the reported offense from 2019 would not be included in the denominator of the clearance rate for 2020.

The method described above is standard practice in criminology, but we recognize it has some non-intuitive features, so we also present arrest rates for the same time periods below. The arrest rate is the share of incidents that lead to an arrest regardless of what year the arrest takes place. The arrest rate is also an unstable measure: arrest rates for a given year can change over time as new arrests are made for past incidents.

We calculate arrest rates using the following formula:

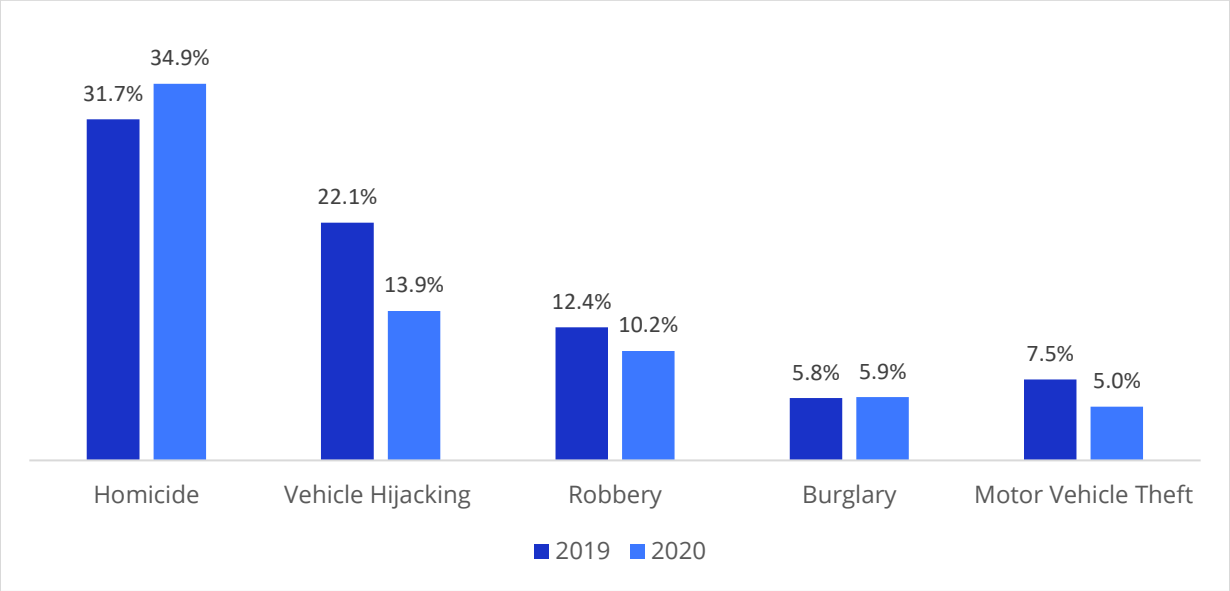
Equation 2

$$\frac{\begin{array}{c}offenses\ in\ year\ t\ for\ which\ there\ is\ an\ associated\ arrest,\\ regardless\ of\ the\ year\ in\ which\ the\ arrest\ was\ made\end{array}}{offenses\ in\ year\ t}$$

To use the example above--a homicide reported in 2019 but with an arrest in 2020--the arrest rate for 2019 would include the 2019 reported homicide in the denominator of Equation 2 as well as the 2020 arrest in the numerator of Equation 2. The 2019 homicide would not be included in the arrest rate for 2020 at all.

Using the arrest rate method, we see that vehicular hijacking arrest rates declined in 2020:

Figure 3.4: Arrest Rates



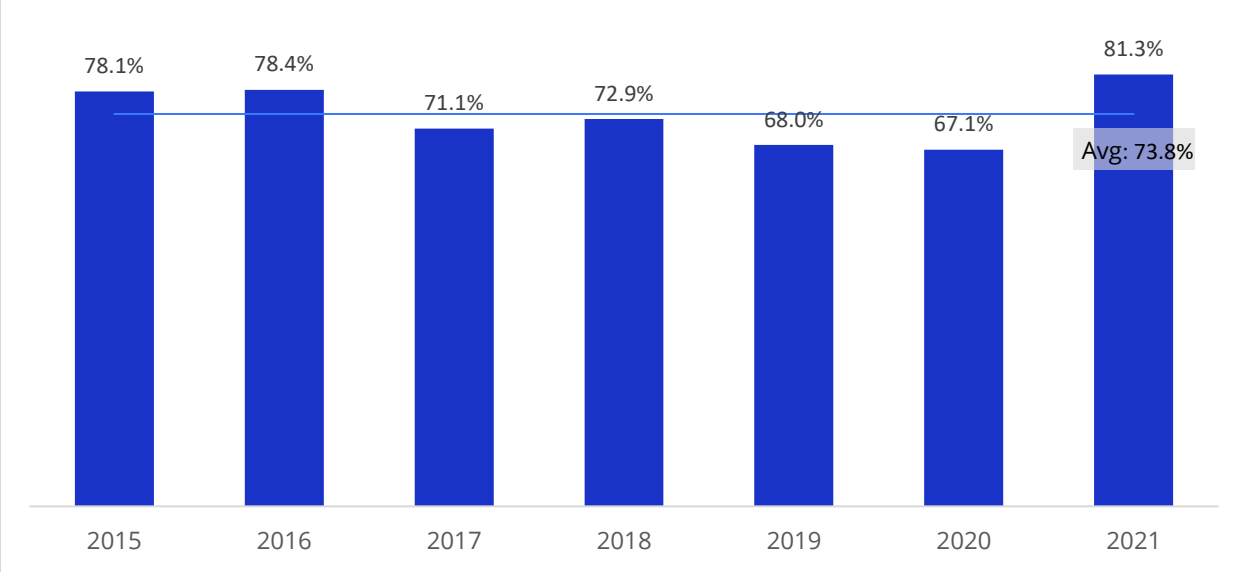
This chart depicts arrest rates at the incident level for each charge. Source: CPD data.

4. Victim Reports of Suspect Age

When a carjacking suspect is arrested, we know their date of birth. However, since a large share of carjackings do not result in arrest, we may worry that the subset of suspects who wind up getting arrested might not be representative of the larger population of all suspects. To address that problem, we also make use of data on victims' reports of suspects' ages.

When a vehicular hijacking victim reports the crime to the police, they are asked to give an estimated age range for the suspect(s), providing an alternative source of information about youth involvement. Victim age range estimates were available in 67 percent of incidents in 2020. That share has remained steady over the past several years:

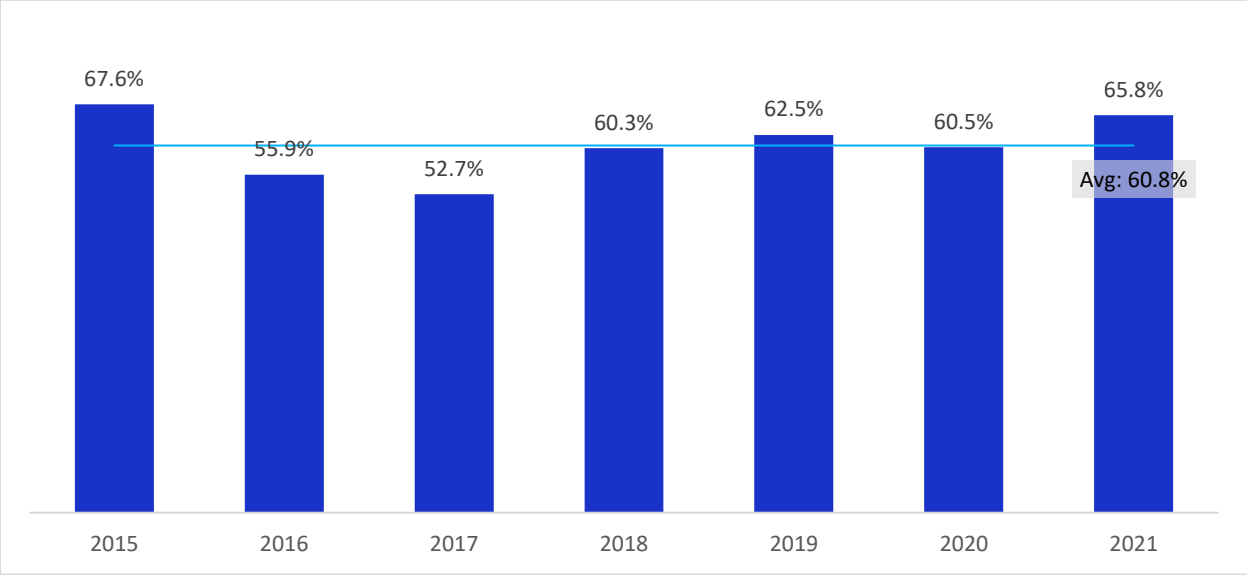
Figure 4.1: Availability of Age Range Estimates



This chart depicts the percentage of instances in which a victim provides an age range for at least one suspect (incident level). Source: CPD data.

In cases when suspects were later arrested, we can test the accuracy of victim estimates of the age of young suspects. In 2020, victims placed the youngest suspect in the correct age range 60 percent of the time, a rate that is similar to, if not higher than, that of recent years:

Figure 4.2: Accuracy of Age Range Estimates



This chart depicts the percentage of instances in which the actual age of the youngest arrestee for a given incident fell within the age range that victims estimated for the youngest suspect (incident level). Source: CPD data.

Even when a victim is off in their guess, they are still often accurate to within one or two years:

Figure 4.3: Years Between Age of Arrestee and the Minimum of the Suspect Age Range

	0	1-2	3+
2021	66%	14%	21%
2020	61%	17%	22%
2019	63%	17%	20%
2018	60%	18%	23%
2017	53%	24%	24%
2016	56%	20%	24%
2015	68%	16%	16%

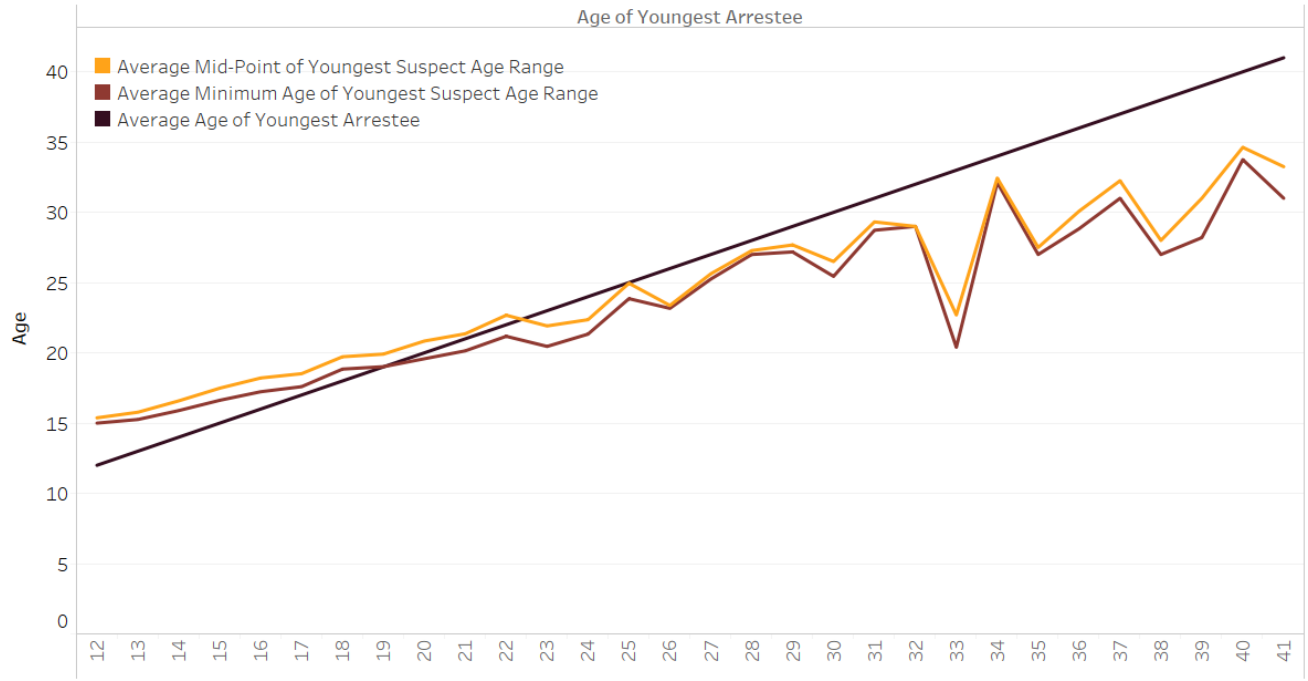
This table depicts the difference in years between the actual age of the youngest vehicular hijacking arrestee and the age of the youngest suspect estimated by victims for each incident, where the age estimated by victims is the minimum of the suspect's age range (suspect level). Note: due to rounding, not all rows add up to exactly 100 percent. Source: CPD data.

Because victims estimate a suspect's age by giving an age range instead of a singular number, we must translate the age range into a single data point for analysis. One way to do this is to count a suspect as under 18 if the victim gives an age range where the *minimum* of the range is under 18. For example, a suspect with an age range of 13-17 would be counted as under 18, as would a suspect with an age range of 15-25.

An alternate method is to count a suspect as under 18 if the victim gives an age range where the *midpoint* is under 18. In the above example, the suspect with an age range of 13-17 would be counted as under 18 since the midpoint of that range is 15, but the suspect with an age range of 15-25 would not be considered under 18 because the midpoint of the range is 20.

Our preferred method is to use the minimum of the age range. We do this given the prevalence of research indicating that adults generally perceive youth to be older than they really are (see, for example, Goff et al (2014)). Indeed, in Chicago's vehicle hijacking data, we find that victims consistently overestimated the age of arrestees under 18 (and tend to underestimate the age of older suspects):

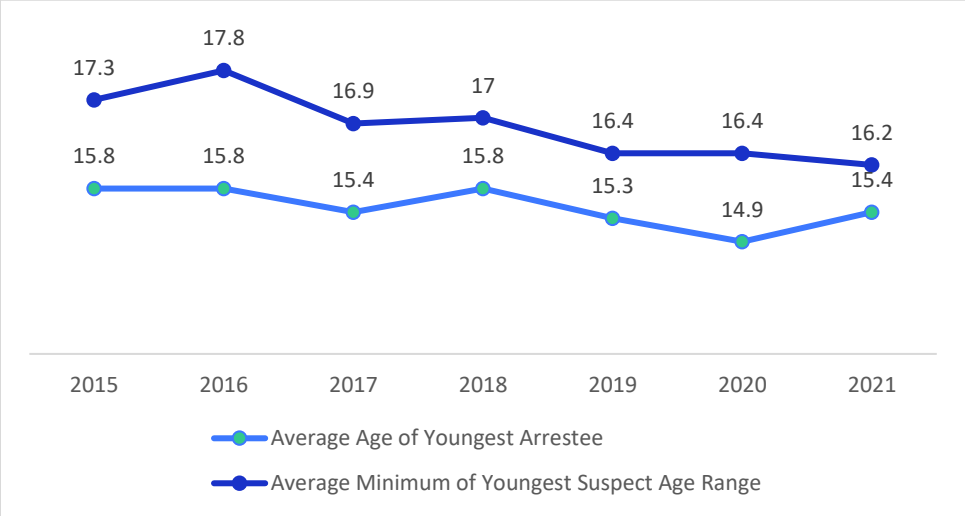
Figure 4.4: Average Minimum/Midpoint of Youngest Suspect Age Range vs. Age of Youngest Arrestee, 2015-2021



This chart depicts the average victim estimates of youngest suspect age by two different methods: 1) treating the youngest suspect's age as the minimum of the age range and 2) treating the youngest suspect's age as the midpoint of the age range. It compares these estimates to the actual age of the youngest arrestee for a given estimate. It is at the incident level. Source: CPD data.

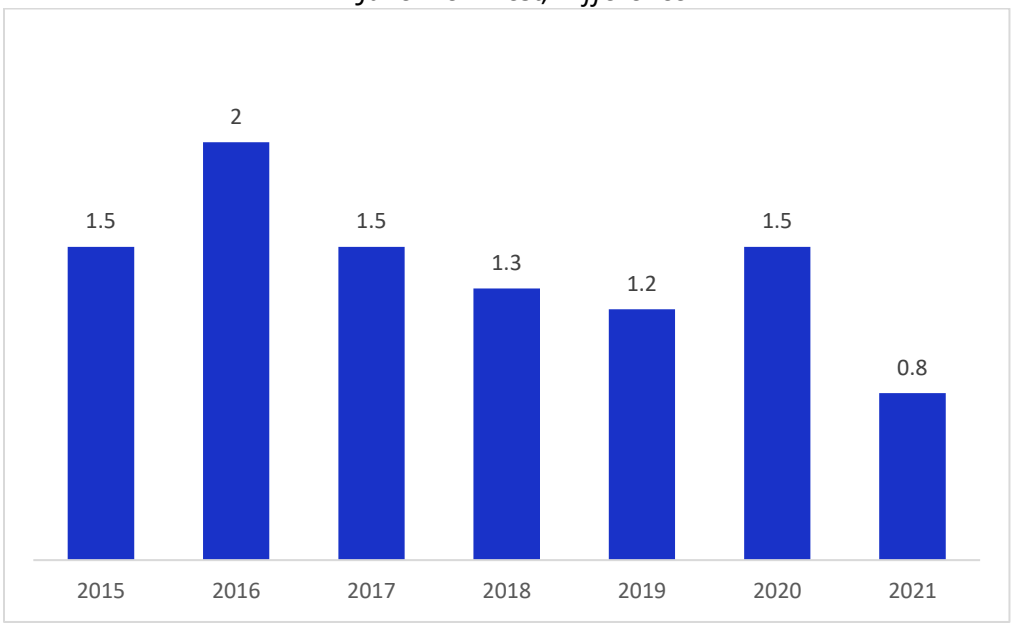
The magnitude of overestimation has remained fairly constant over time:

Figure 4.5: Comparing Youngest Suspect Age Range to Youngest Arrestee in Cases That Resulted in Juvenile Arrest, Average Age



This chart depicts the average minimum of the youngest suspect's age range for all vehicular hijacking incidents that result in a juvenile arrest and the average actual age of the youngest arrestee for each incident that results in a juvenile arrest (incident level). Source: CPD data.

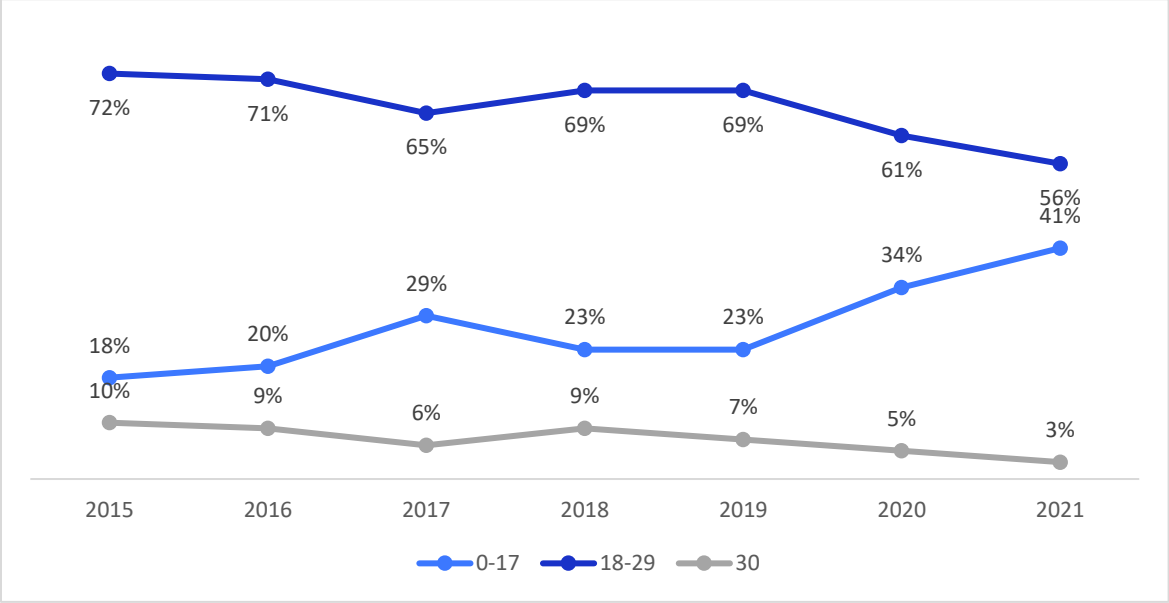
Figure 4.6: Comparing Youngest Suspect Age Range to Youngest Arrestee in Cases That Resulted in Juvenile Arrest, Difference



This chart depicts the difference between the minimum of the youngest suspect's age range and the actual age of the youngest arrestee for each case that results in a juvenile arrest (incident level). Source: CPD data.

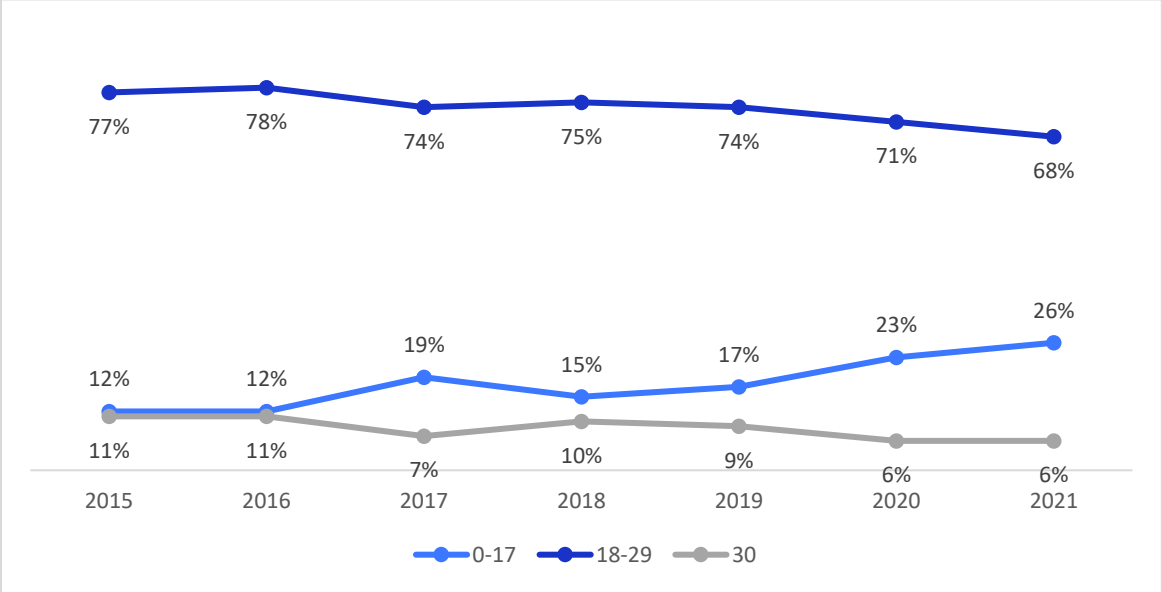
In the column, we present the percentage of suspects who are youth, young adults, and adults over 30 at the suspect level. That is, we pool all suspects from all vehicle hijacking incidents and take the minimum of the age range estimated for each suspect to show the proportion of youth suspected of vehicle hijacking involvement over time:

Figure 4.7: Share of Suspects by Minimum of Suspect Age Range



This chart depicts the percentage of all suspects of a given age. It determines the age of the suspect by the minimum of the suspect's age range (suspect level). Source: CPD data.

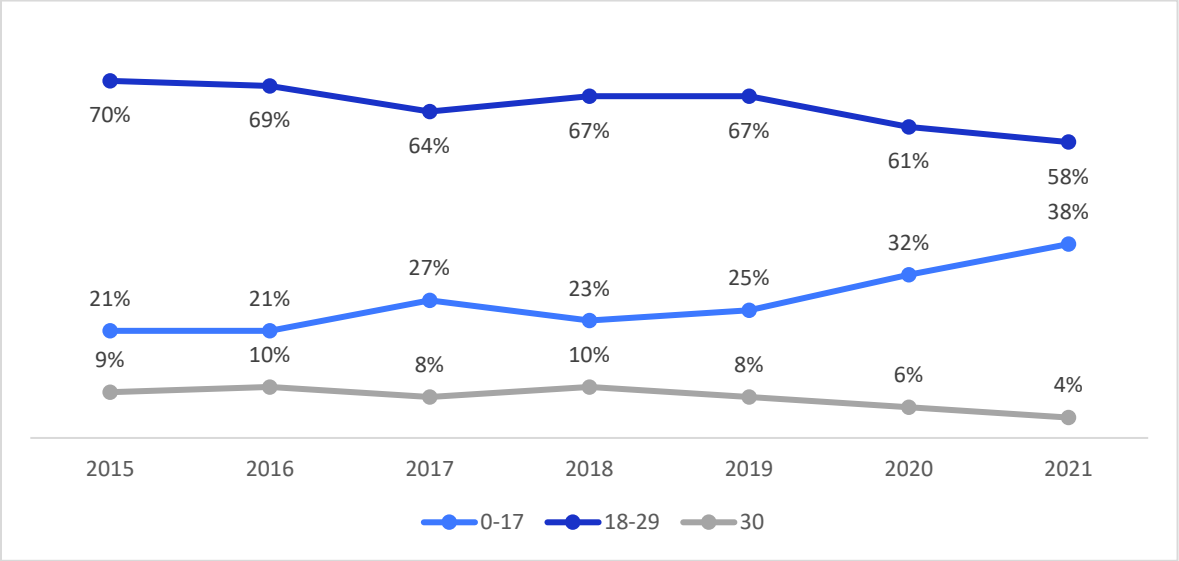
Figure 4.8: Share of Suspects by Midpoint of Suspect Age Range



This chart depicts the percentage of all suspects of a given age. It determines the age of the suspect by the midpoint of the suspect's age range (suspect level). Source: CPD data.

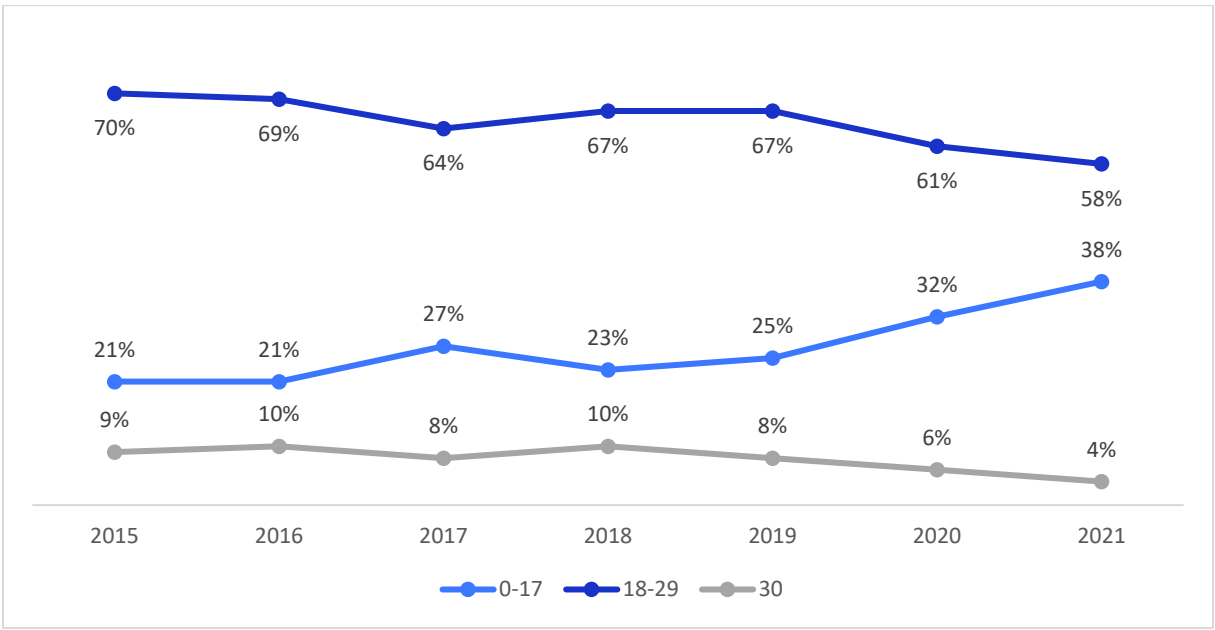
This same analysis can be approached at the incident level. Here, the unit of analysis is a given vehicle hijacking event. We take the minimum of the age range for the *youngest* suspect to show the proportion of suspects at each age over time:

Figure 4.9: Share of Incidents by Youngest Suspect Age, by Minimum of Youngest Suspect Age Range, at the Incident Level



This chart depicts the percentage of all incidents involving a youngest suspect of a given age. It determines the age of the youngest suspect by the minimum of the youngest suspect's age range (incident level). Source: CPD data.

Figure 4.10: Share of Incidents by Youngest Suspect Age, by Midpoint of Youngest Suspect Age Range, at the Incident Level



This chart depicts the percentage of all incidents involving a youngest suspect of a given age. It determines the age of the youngest suspect by the midpoint of the youngest suspect's age range (incident level). Source: CPD data.

5. Arrest Rates

To address concerns about whether the apparent increase in youth carjacking involvement might be the result of youth having an increased propensity for arrest in 2020, we examined the relative share of incidents resulting in an arrest for youth versus adults over time. Since vehicle hijackings can involve more than one suspect, an incident is counted as resulting in arrest if there is any arrest regardless of year (the arrest does not have to occur in the same year as the incident). That is, the youth arrest rate is equal to:

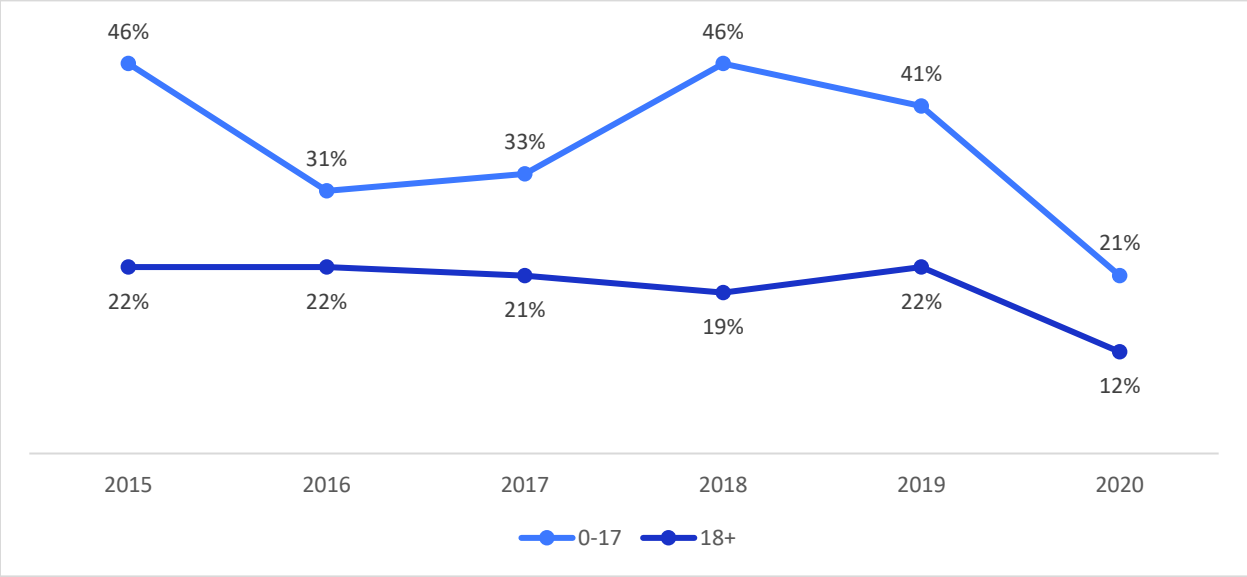
Equation 3

$$\frac{\begin{array}{c}vehicular\ hijacking\ incidents\ with\ a\ youth\ suspect\ in\ year\ t\ that \\ led\ to\ an\ arrest\ of\ any\ age\end{array}}{vehicular\ hijacking\ incidents\ with\ a\ youth\ suspect\ in\ year\ t}$$

As an illustrative example, if a 25-year-old and a 15-year-old are both suspected of being involved in the same vehicular hijacking incident, that is considered an incident with a youth suspect. If the 25-year-old is arrested and the 15-year-old is not, the incident is still included in the numerator above.

The arrest rate for youth in 2020 declined relative to the adult arrest rate, so the increase in youth carjacking does not seem to be the result of increased youth propensity for arrest:

Figure 5.1: Arrest Rates by Youngest Age of Suspect Involved in Carjacking By Minimum of Youngest Suspect Age Range



This chart depicts arrest rates at the incident level by the minimum of the youngest suspect's age range. Source: CPD data.

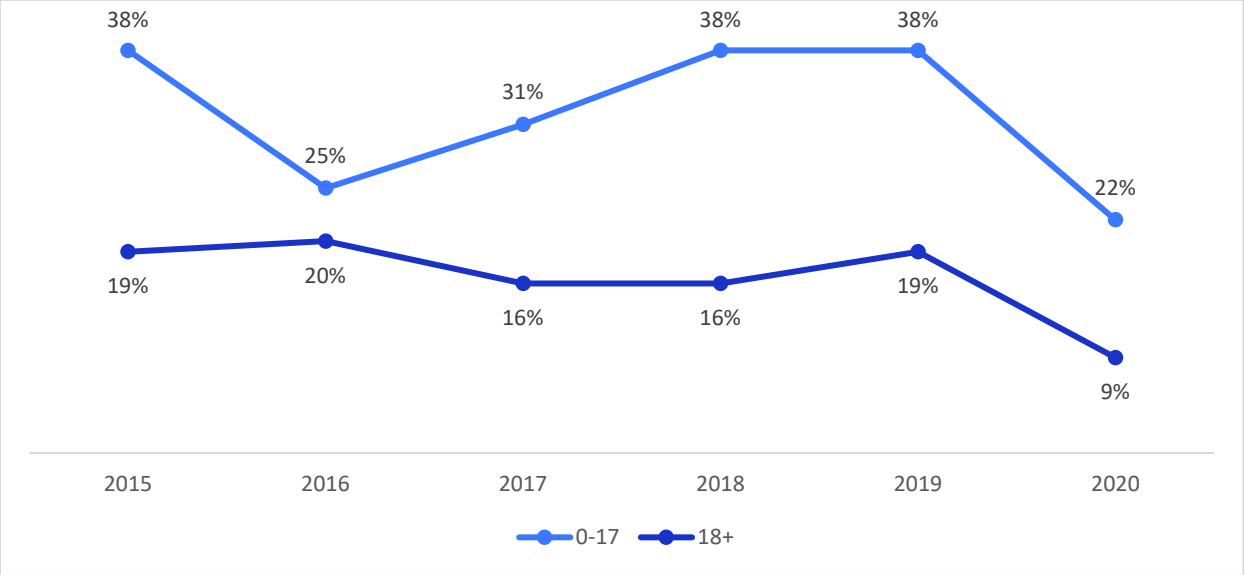
An alternate method is to restrict the numerator to only incidents involving a youth suspect in which a youth is actually arrested. The youth arrest rate in this case is equal to:

Equation 4

$$youth\ arrest\ rate = \frac{vehicle\ hijacking\ incidents\ with\ a\ youth\ suspect\ in\ year\ t\ that\ led\ to\ an\ arrest\ of\ a\ youth\ suspect}{vehicle\ hijacking\ incidents\ with\ a\ youth\ suspect\ in\ year\ t}$$

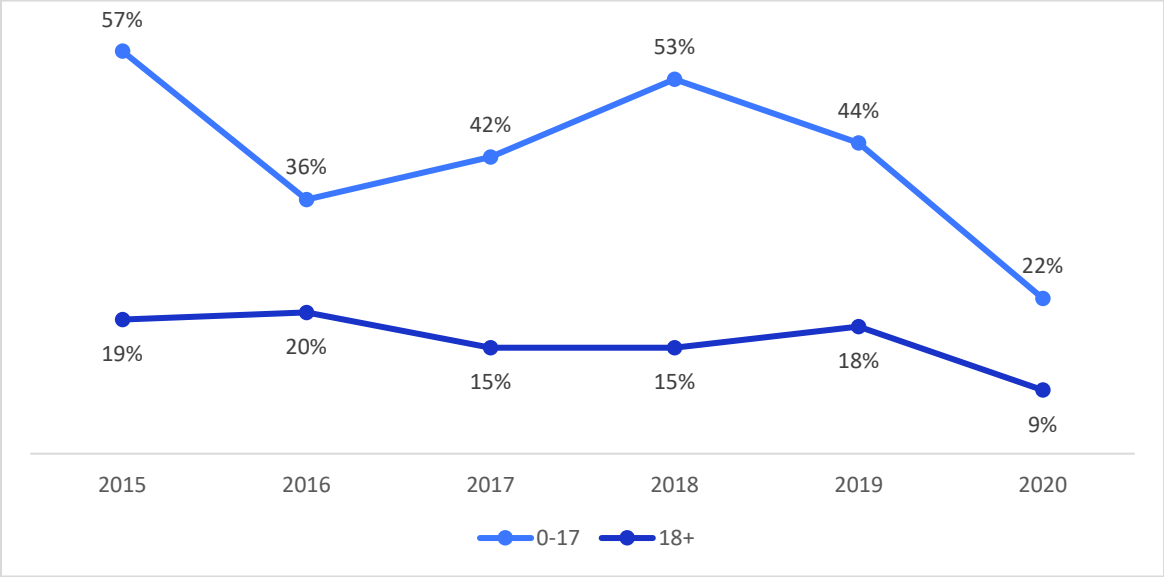
Even in cases when vehicle hijacking incidents involving someone perceived as a youth are cleared by an arrest of a youth, the arrest rate for youth suspects still declines in 2020 relative to the arrest rate for adult suspects.

Figure 5.2: Arrest Rates Where Age of Youngest Suspect Matches Adult/Youth Status of Youngest Arrestee, 2015-2020, Minimum of Youngest Suspect Age Range



This chart depicts arrest rates at the incident level by the minimum of the youngest suspect's age range. Source: CPD data.

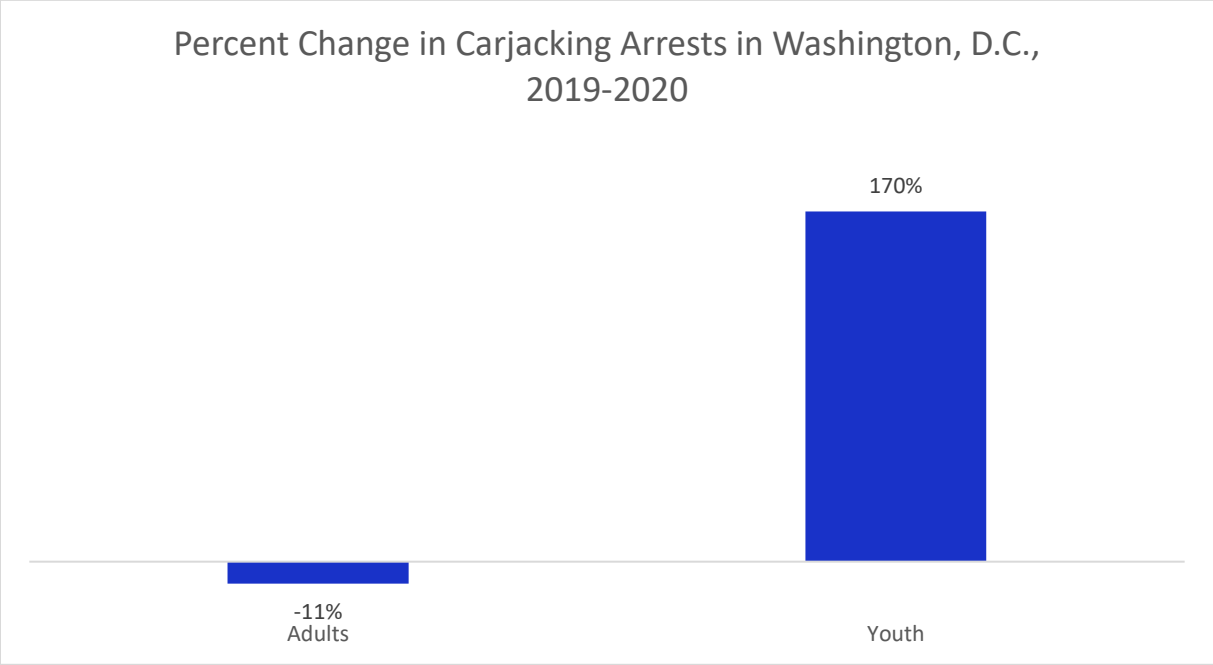
Figure 5.3: Arrest Rates Where Age of Youngest Suspect Matches Adult/Youth Status of Youngest Arrestee, 2015-2020, Midpoint of Youngest Suspect Age Range



This chart depicts arrest rates at the incident level by the midpoint of the youngest suspect's age range. Source: CPD data.

6. Percent Change in Arrests for Washington, D.C.

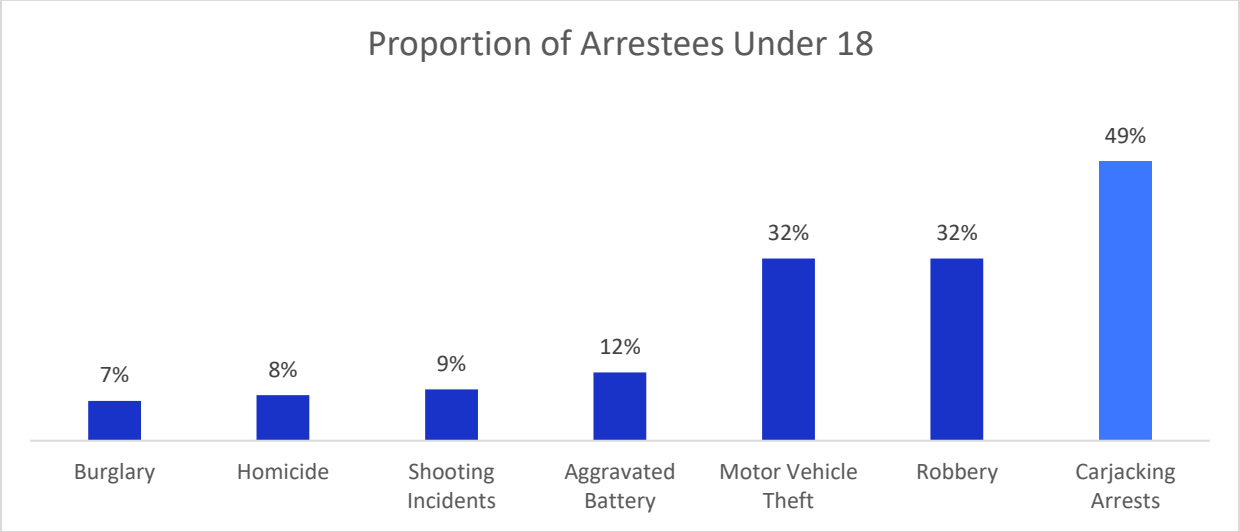
Figure 6.1: Percent Change in Carjacking Arrests in Washington, D.C., 2019-2020



This chart depicts the percent change in number of adult arrests and percent change in number of youth arrests on the suspect level with the charge descriptions of “carjacking”, “unarmed carjacking”, or “armed carjacking”. Source: MPDC data.

7. Proportion of Arrestees Under 18

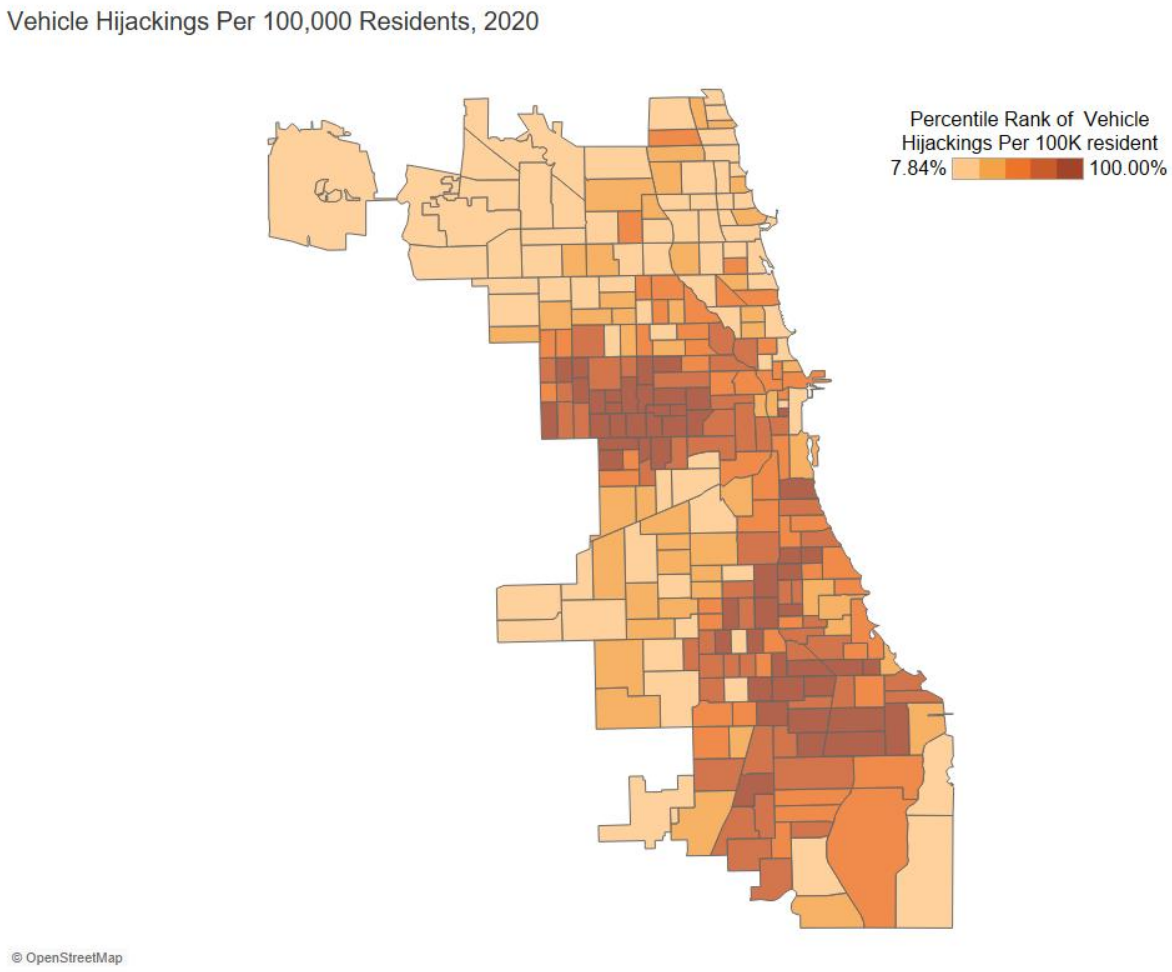
Figure 7.1: Proportion of Arrestees Under 18



This chart depicts the share of arrestees who were under 18 for each charge in 2020 at the suspect level. Source: CPD data.

8. Geographic Distribution of Vehicular Hijackings

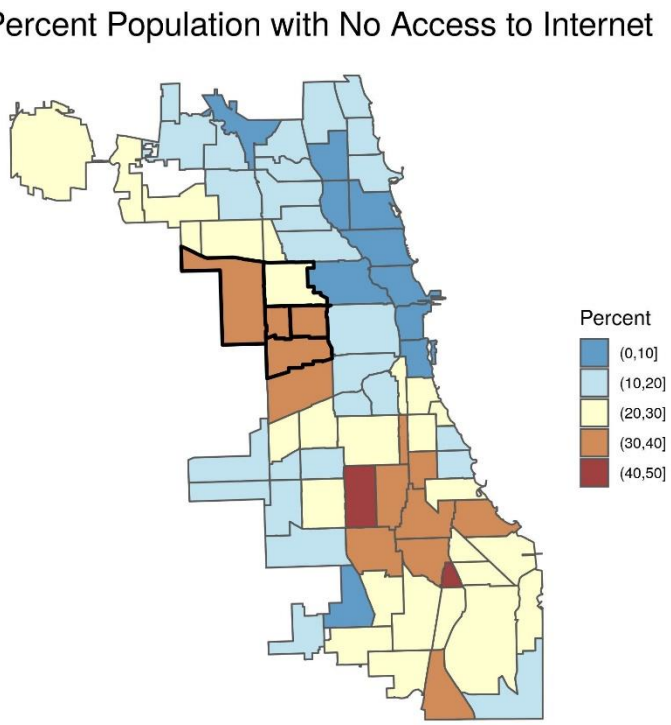
Figure 8.1: Vehicular Hijackings per 100,000 Residents, 2020



This chart depicts the number of vehicular hijacking incidents per 100,000 residents in 2020. Source: CPD data.

9. Population Without Internet Access

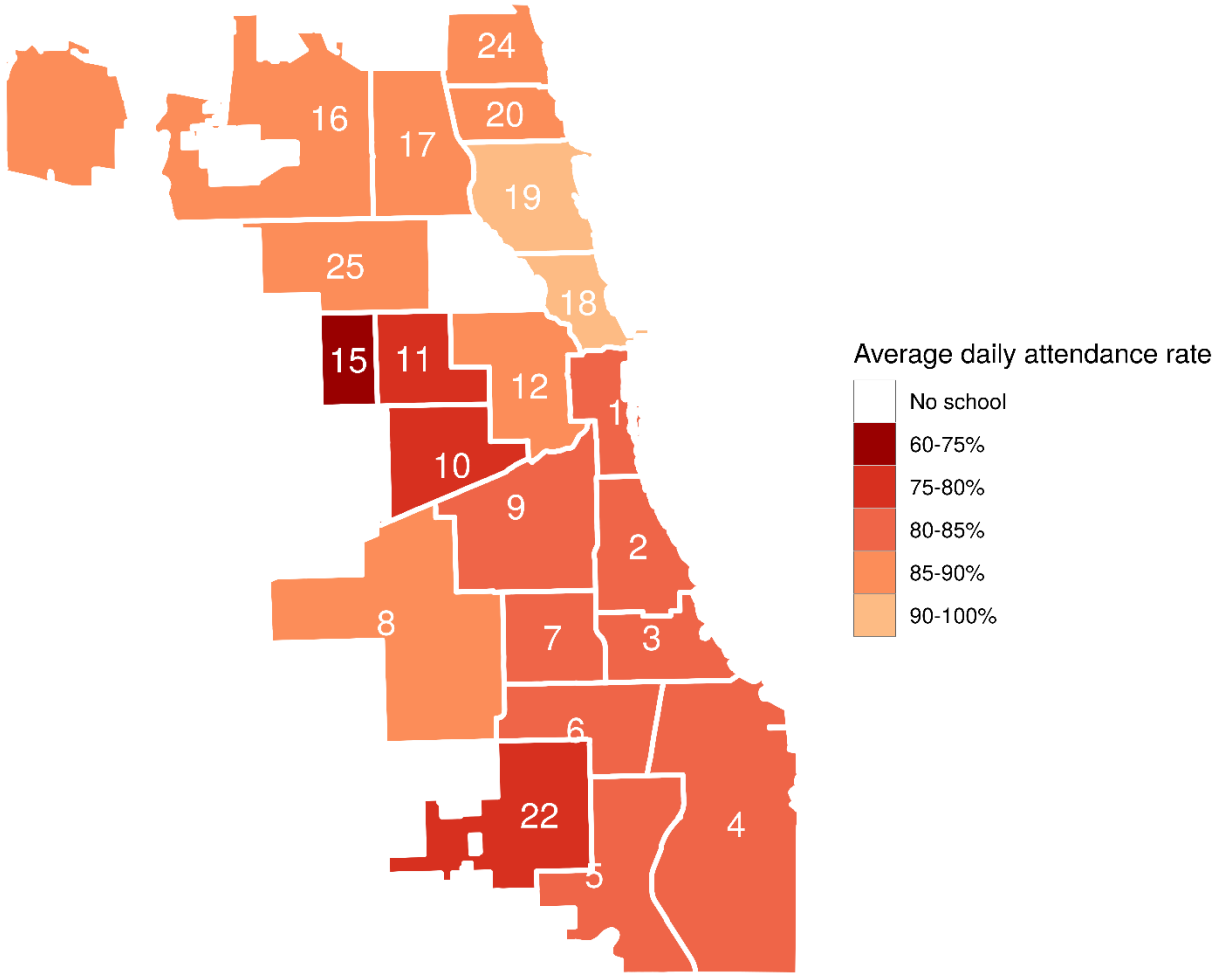
Figure 9.1: Percent Population with No Access to Internet



This chart depicts the percent of the population without access to the internet. Source: Census data.

10. Average Daily School Attendance Rate

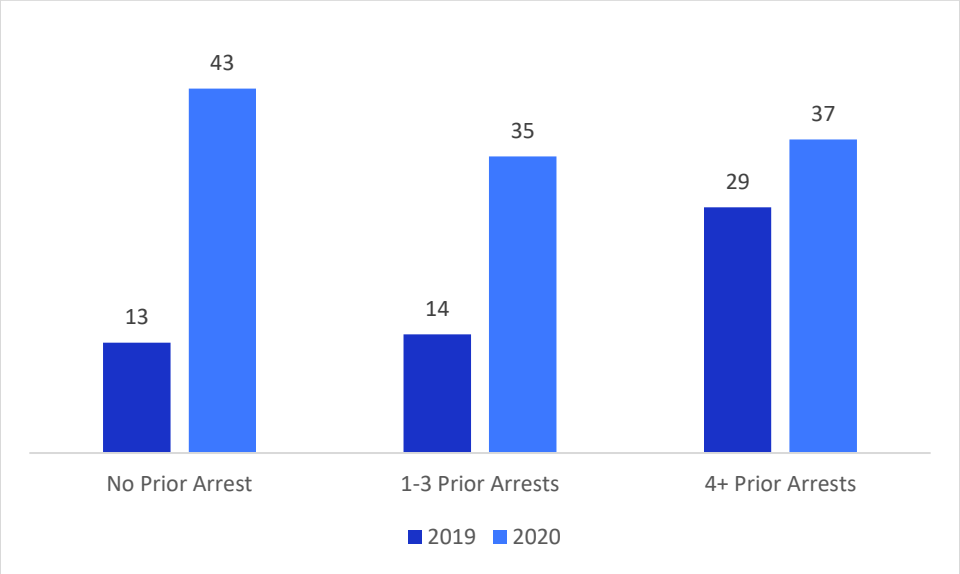
Figure 10.1: Average Daily School Attendance Rate



This chart depicts the average daily attendance rate at all schools with any or all of grades 9-12.
Source: ABC7 FOIA-requested CPS data (link).

11. Arrest Histories

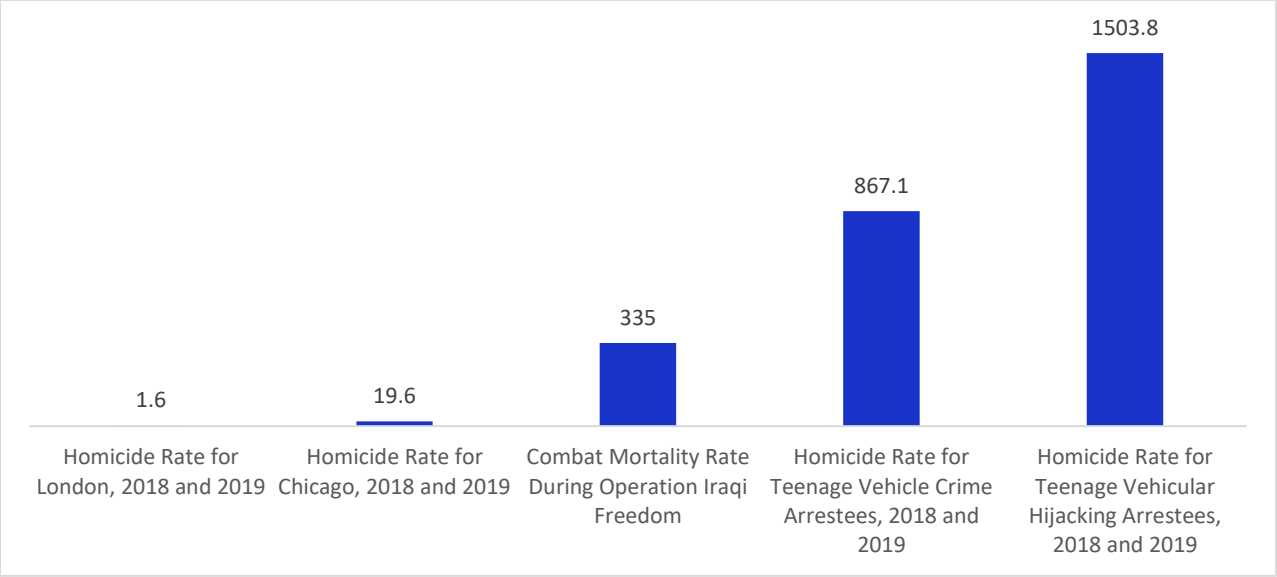
Figure 11.1: Arrest History of Youth Carjacking Arrestees



This chart depicts prior arrest history of all vehicular hijacking arrestees under 18 for 2019 and 2020 at the suspect level. Source: CPD data.

12. Homicide Rates per 100,000

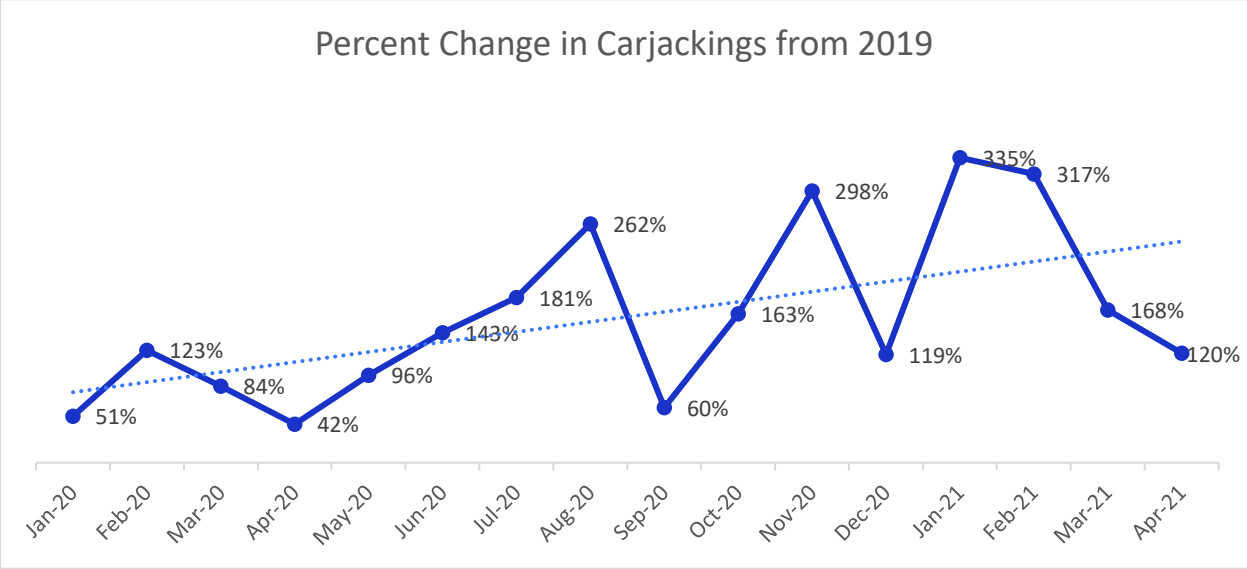
Figure 12.1: Homicide Rates per 100,000



This chart depicts homicide rates for the city of London and the city of Chicago, Chicago teenage vehicle crime arrestees, and Chicago teenage vehicular hijacking arrestees for 2018 and 2019, as well as the mortality rate for combat soldiers during Operation Iraqi Freedom. London sources: The Guardian, Eurostat. Chicago sources: FBI, Census. Chicago vehicle crime arrestee and Chicago vehicular hijacking arrestee sources: CPD data. Iraq War combat mortality rate source: Goldberg (2010).

13. Percent Change in Carjackings from 2019

Figure 13.1: Percent Change in Carjackings from 2019



This chart depicts the percent change in carjackings in a given month compared to the same month in 2019. Source: CPD data.

REFERENCES

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