Recidivism Project: Data Exploration and Visualization

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The "three-year Recidivism for Offenders Released from Prison in Iowa" dataset provided by the Iowa Department of Corrections [1] describes individuals who have been released from prison and tracks whether they are returned to prison (reincarceration) for an offense following their release (recidivism). This data contains over 25,000 records relating to former inmates being tracked over 6 periods of 3 years, spanning from 2010 to 2018. While the dataset is lacking detail in many regards, it does provide sufficient information to investigate the success of the Iowa Department of Correction's (DOC) efforts to reduce recidivism, as well as observe the presence of well documented biases present in the correctional system of the United States.

Initial assessments of the dataset were directed towards the temporal variables present within the data: period of observation following prisoner release, and days from release to recidivism. While somewhat variable, the number of prisoners released is relatively stable from 2010 through 2015, with a peak in 2012 and subsequent decline in the following years (Figure 1). In 2014 and 2015 total number of prisoners released is within 20% of the values published by the Bureau of Justice Statistics (BJS), and attributable to differences in methodology, indicating the individuals in the sample represent nearly all prisoners released in Iowa [2]. Notably, the number of individuals released and subsequently reincarcerated increased every year regardless of the total number of prisoners released. This would indicate that the rate of recidivism is increasing over time within the sample, a finding consistent with broader trends for recidivism in the United States [3]. Observed more closely, plotting the cumulative recidivism rate for each day of each study period produces nearly identical distributions between study periods (Figure 2). As noted, the recidivism rate is consistently higher for every study period beginning in 2012 through 2015, but there is no change in the distribution over time. This suggests the trend towards greater recidivism cannot be attributed to isolated events within a given study period and is likely tied to a broader trend. While increased incarceration is troubling, the recidivism rate of the sample still falls below rates used in contemporary models [3].

Figure 1:

Columns represent all individuals observed in the dataset. Each column is associated with a span of years beginning in the fiscal year that individuals were released through a three-year period. Columns are subdivided into populations that did or did not recidivate.

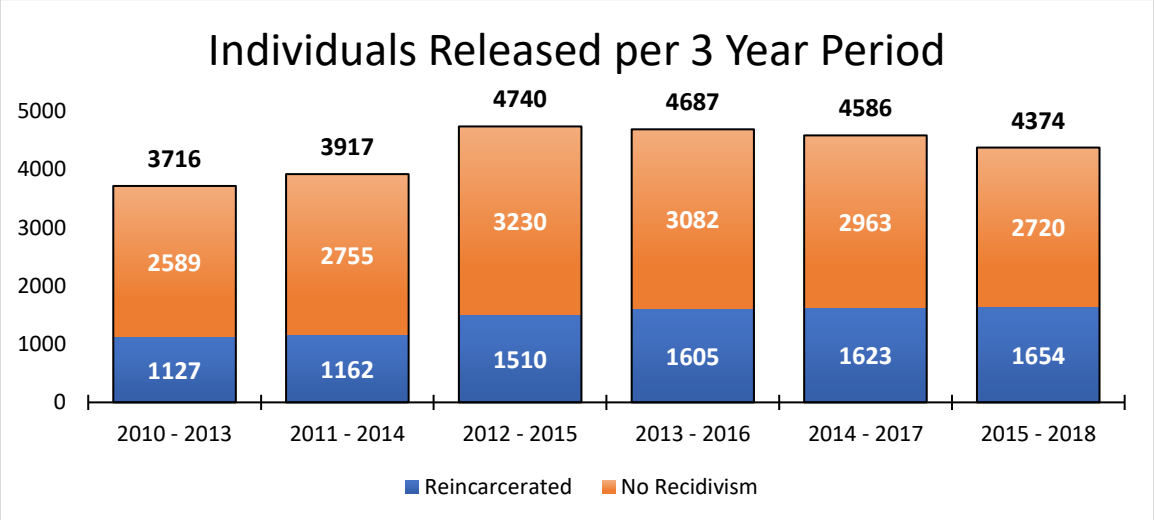
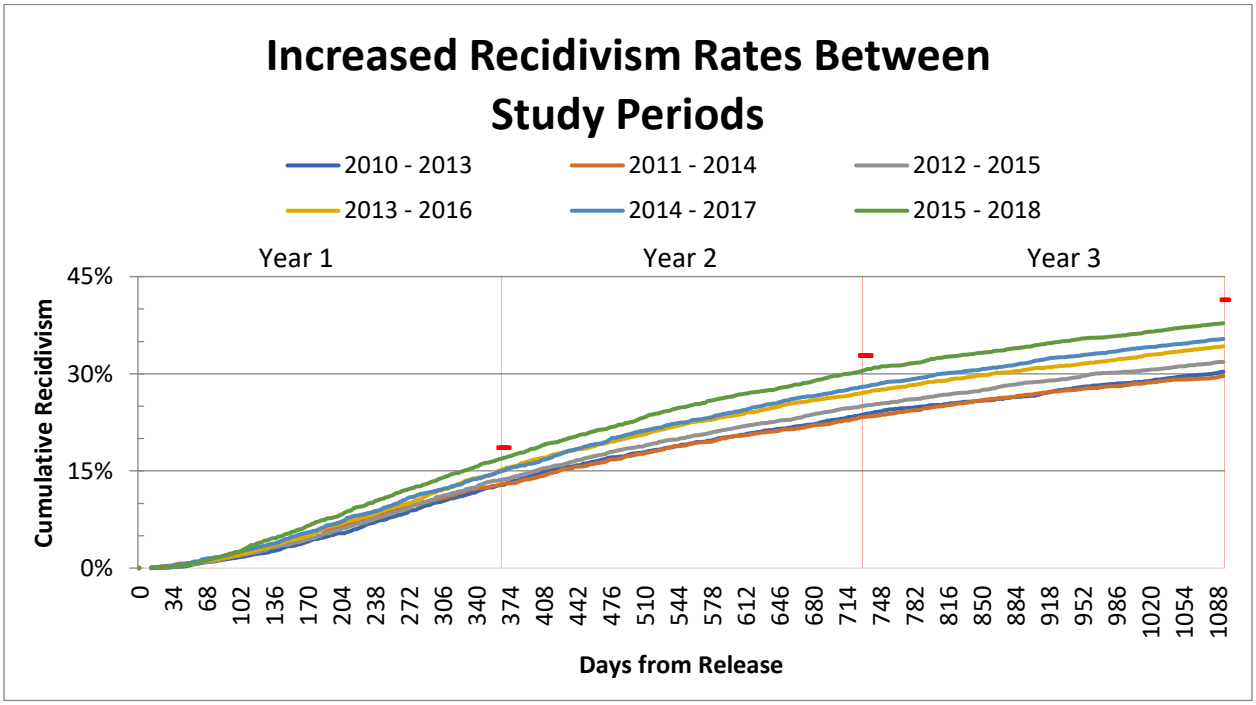


Figure 2:

Each line corresponds to a three-year period of the study and represents the cumulative persons who recidivated, relative to the total number of persons released during the first year of the study period. Cumulative relative recidivism is calculated and reported for each day across all study periods. Vertical red lines denote 365-day periods corresponding to each year of a three-year study period. A horizontal dash indicates estimated recidivism for released prisoners modeled in Shannon et. al., 2017.



The Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) risk assessment tool was validated using a two-year follow-up period [4]. While this diverges from the three-year follow-up period used in many similar studies [5, 6, 3], this is a reasonable study period. Evidence suggest that the rate of recidivism is highest in the first year following release, declining the longer a prisoner is released [5]. This trend is observable in the Iowa dataset, where the number of individuals reincarcerated appears to increase rapidly following release, peaking around nine months post release (Figure 3).

One of the more popular predictors of recidivism used in COMPASS and other models for recidivism is age [7, 4, 8]. Age data provided by the Iowa DOC is binned into roughly ten-year categories (Figure 4). Predictably, we observe a decline in the relative number of individuals that recidivate with increased age across categories. This is true for both new offenses and the more nebulous technical violations that can result in reincarceration.

However, a somewhat unique parameter of the dataset provided by the Iowa DOC is the assignment of previously incarcerated individuals to a "target population." The Iowa DOC describes this variable as, "specific strategies to reduce recidivism rates for prisoners who are on parole" [1]. Though an oblique description, the variable appears to be a strong predictor of recidivism (Figure 5). Particularly

Figure 3:

Scatterplot of Days from Release and number of individuals reincarcerated across the entire sample. Trendline displays a 30-day moving average.

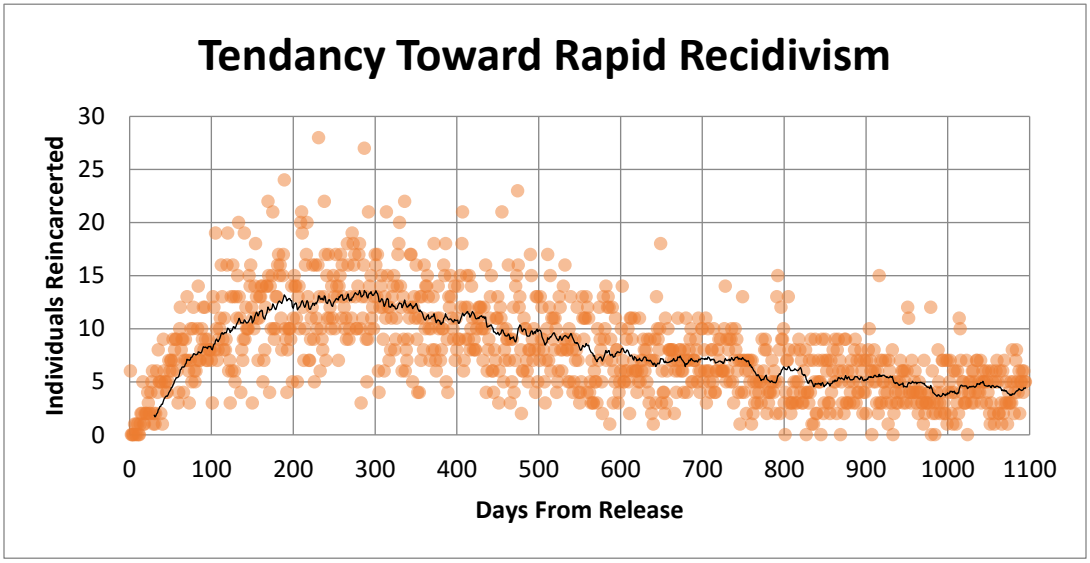
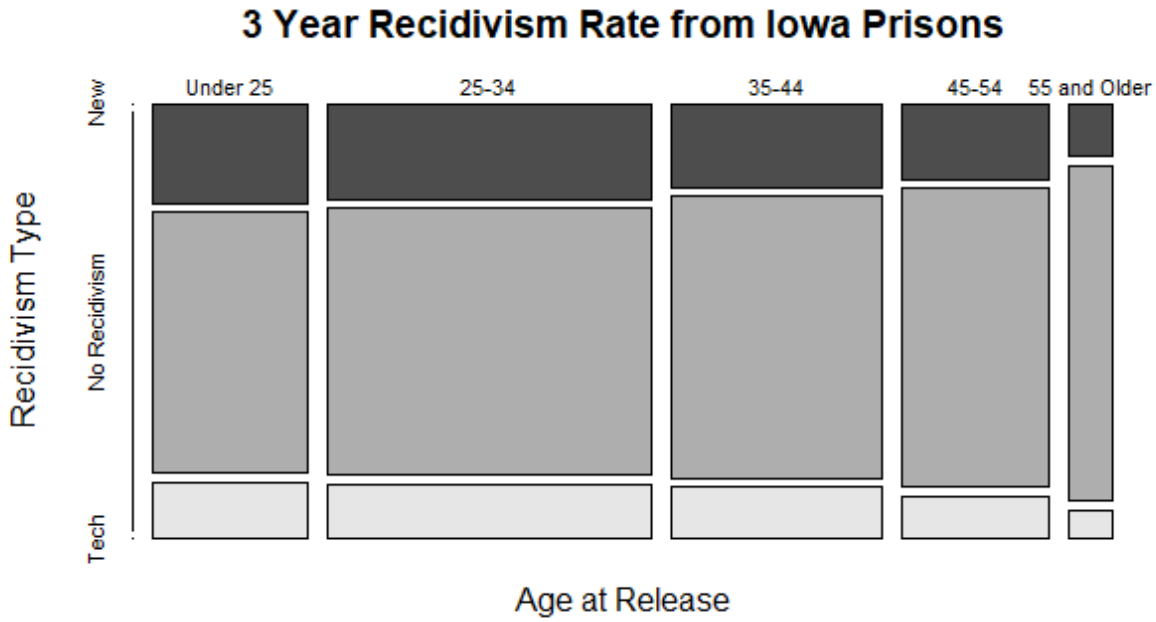


Figure 4:

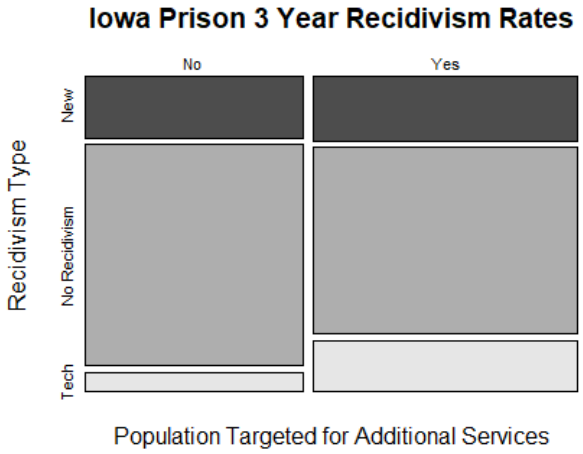
This plot describes recidivism by age of individual at time of release. Ages are binned into roughly 10-year spans, and recidivism type is subdivided into new infraction and technical violations that can result in reincarceration.



for technical violations, as members of the target population where reincarcerated due to technical violations at several times the rate of those who were not included in these "specific strategies." A series of thin descriptions of services provided to target populations can be found in literature released by the Iowa DOC, which for parolees seems to focus on more interactions with their assigned officer [9]. The targeted population includes former inmates who have been discharged, given special sentencing, or released under unspecified conditions in addition to those released on parole. While the proportion of parolees and individuals given special sentencing have a larger proportion of individuals included in the targeted population, reincarceration is greater across all release conditions for individuals included in the target population (Figure 6).

Figure 5:

Plot compares whether an individual was included in the "target population" of the Iowa DOC to recidivism, subdivided by new offense or technical violation leading to incarceration.



Within the recidivate population we have the opportunity to compare initial offense to the recidivate offense. For each major offense category, we observe that recidivism is primarily associated with a repetition of the same category of offense (Figure 7). There is some introduction of variation within the new offenses, but in all cases the most populous offense is related to the initial incarcerating offense. However, the technical violations, previously noted to result in reincarceration, of an unspecified nature are somewhat proportionately distributed among the categories of initial offense (Figure 7).

The "offenders" described in the data are a recognizable population, representative of who is currently frequently incarcerated by the criminal justice system of the United States. Along gender lines the population of individuals released in the dataset was overwhelmingly male. This is consistent with what the BJS reported as the distribution of Iowan prisoners by sex in 2014 and 2015 (Figure 8) [2]. Similarly, the proportion of black inmates, regardless of gender, is significantly higher than that of white inmates proportional to the relative population of ethnically black Iowa residents (Figure 9) [10]. This is consistent with broader trends in the United States Criminal Justice system that disproportionately target ethnic minorities and black men in particular [3, 2, 11].

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Figure 6:

Compares release condition of former prisoners to their inclusion in the Iowa DOC target population and reincarceration within the three-year study period.

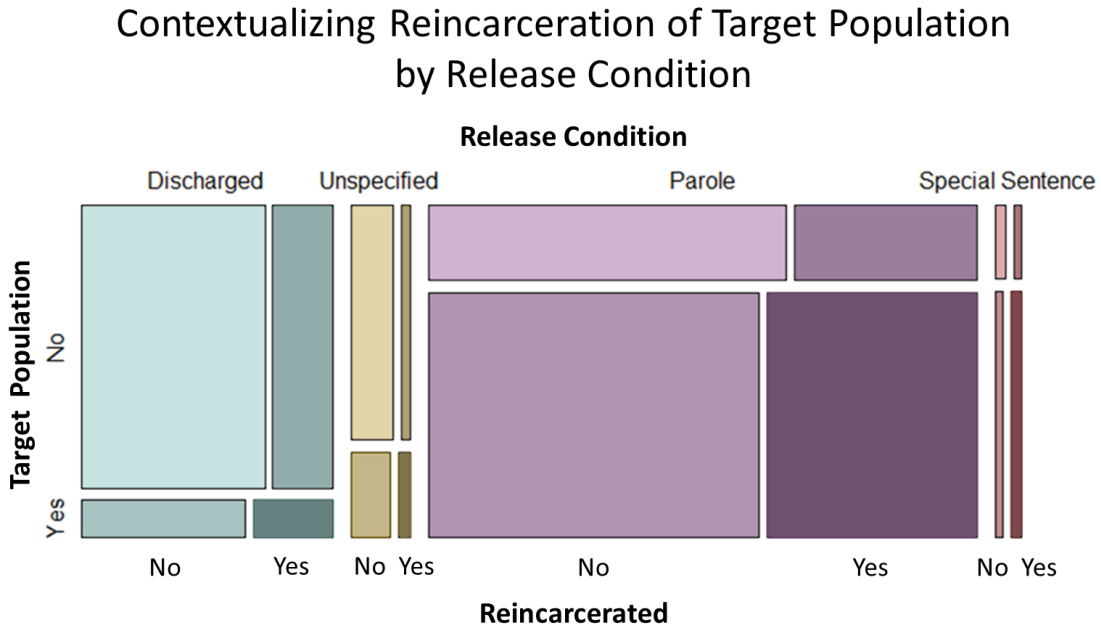


Figure 7:

Each column relates to an initial offense described on the y-axis. The proportion of reincarcerated individuals that compose each column are subdivided into colored segments corresponding to the new offense that lead to reincarceration.

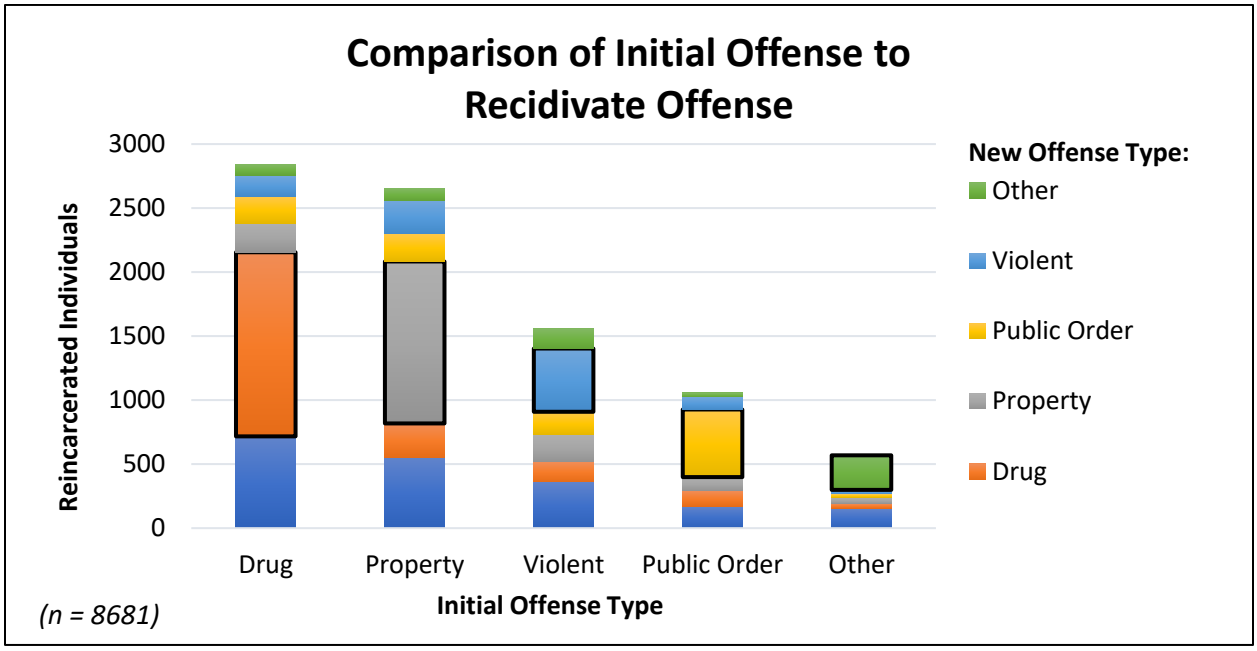


Figure 8:

The first two columns relate the proportion of male and female inmates in Iowa prisons during 2014 and 2015 as reported by the Bureau of Justice Statistics (BJS) [2]. *The third column relates the ratio of male to female individuals released from Iowa prisons that were included in the dataset.*

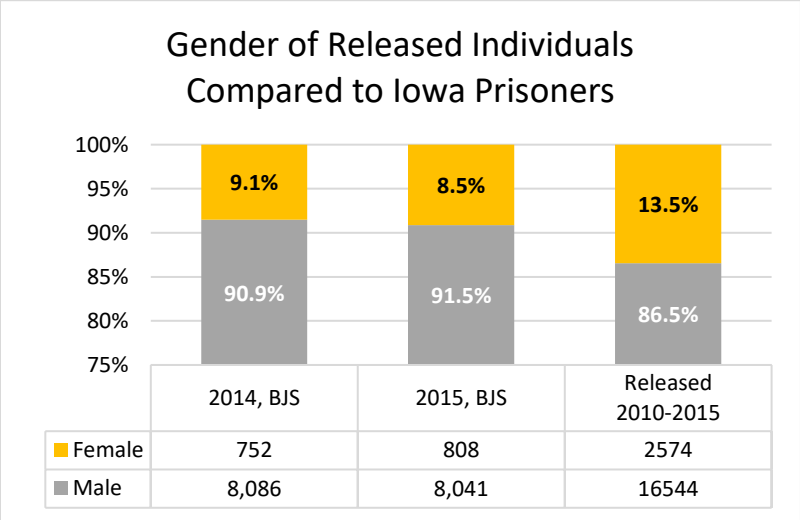
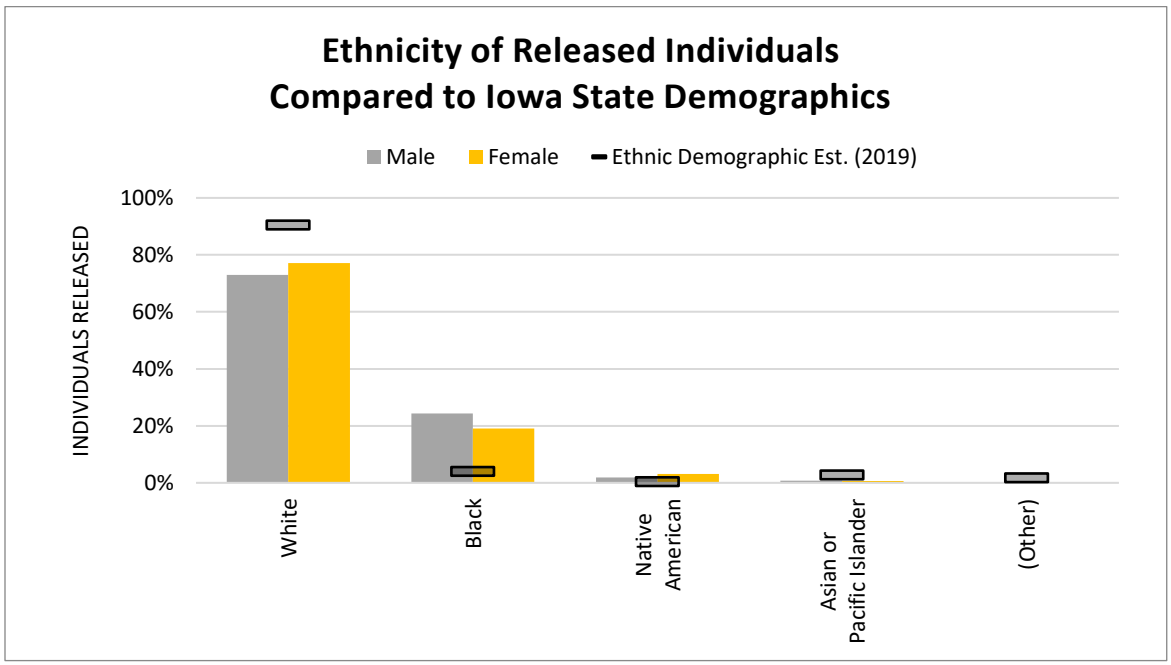


Figure 9:

Each column denotes the proportional inclusion of different racial ethnicities in the data set, split by gender. For each pair of gendered columns, a horizontal black bar denotes the proportion of Iowa citizens who identify as the associated racial ethnicity.



Consideration was given to additional variables associated with individuals described in the data including Hispanic identity and supervising district. These potential components of future models predicting target population selection or potential for recidivism did not yield immediately interesting data. These variables will be potentially be discussed alongside any additional variables that prove valuable when models are later assembled as part of this project.

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