

# Methodology and Data Notes

Justice System Disparities: Black-White National Imprisonment Trends, 2000 to 2020

## STUDY PERIOD

The primary study period covers 2000 to 2020, although offense-specific results are reported from 2000 to 2019 because data by race and Hispanic origin for offense-specific prisoner<sup>1</sup> counts were only available through 2019 at the time of analysis.

## DATA SOURCES

The sources of data were:

**Number of prisoners by race and Hispanic origin and total number of prison admissions and releases.** This report used the National Prisoners Statistics (NPS), a Bureau of Justice Statistics (BJS) annual survey of state and federal departments of corrections that counts individuals in prison by race and Hispanic origin as defined and reported by the administrative data systems of corrections departments. The data were obtained from the National Archive of Criminal Justice Data (NACJD).<sup>2</sup>

The NPS data provided the total number of individuals in prison by race and Hispanic origin. The totals used in this report include all individuals in prison under the jurisdiction of a state correctional agency. Data for federal prisoners, which include persons sentenced by the District of Columbia Superior Court, are excluded. The NPS also provides counts of the total number of individuals admitted into prison, by type of admission, and the number released, by type of release. The admissions and release data in the NPS are not collected by race and Hispanic origin. The authors estimated admissions and release by race and Hispanic origin (see below).

The authors reviewed NPS data for completeness and consistency and in a few cases corrected misplaced values and imputed counts for missing years. For example, in some years for some states, the values for some racial/ethnic categories, such as Asian or Pacific Islander or Native Hawaiian, were reported as “unknown,” and the number unknown was the reported number of individuals in this racial/ethnic category. These errors were corrected. In other cases, race-specific counts were missing for one or more years in a few states. Most of these omissions occurred in states with smaller prison populations. The authors imputed the missing values by assuming a linear trend in the count from the year prior to the missing data to the year after the missing data and interpolated the counts. They compared counts before and after these adjustments and found that the differences amounted to less than one percent.

Imprisonment rates used are based on the U.S. adult resident population and the total number of individuals in prison under jurisdiction of state correctional agencies. These rates may differ from

those published by BJS, as the BJS imprisonment rates are based on individuals whose prison sentences were longer than one year, a group that BJS defines as “sentenced prisoners.” The NPS data available from NACJD do not include counts of the number of sentenced prisoners by race or Hispanic origin. (See “Bridged Race Population Estimates” below for additional information on imprisonment rates.)

**Offenses of persons admitted into, released from, or held in state prison at year end by race and Hispanic origin.** The report used BJS’s National Corrections Reporting Program (NCRP), a collection of individual-level data on admissions into and releases from state prison facilities during a year and individuals held in state prisons at year end (i.e., the prisoner stock). These data include measures of race and Hispanic origin of individuals in prison as defined and reported in the states’ administrative systems. Data were obtained from the National Archive of Criminal Justice Data.<sup>3</sup>

At the time of this account, the NCRP data were available through 2019. Consequently, all crime-specific estimates run through 2019, not 2020.

The authors used the NCRP data to generate offense-specific distributions of individuals in state prisons by race and Hispanic origin, as well as estimates of admissions, releases, and length of stay by offense and race and Hispanic origin. To obtain national estimates of the race and Hispanic origin counts of prisoners by crime, the authors weighted the NCRP data to the NPS totals using the race and Hispanic origin specific ratio of NPS-to-NCRP counts and applied the proportion of individuals across offenses within each group to the race and Hispanic origin totals. This approach is the one that BJS and others have used with the NCRP. To generate estimates of admissions and releases by offense, race, and Hispanic origin, the authors first used the NCRP to generate the percentages of admissions and releases by race and Hispanic origin to get the relative distribution of admissions by race. They then applied these to the NPS total admissions and releases to generate race-specific total admissions and releases. To these totals, the authors applied the percentages of individuals by offense within race and Hispanic origin to get offense, race, and Hispanic origin estimates of admissions and releases.

Not all states report to the NCRP in each year of the study period. During the period, between 42 and 50 states reported data. Most of the non-participating states had smaller prison populations, making their contribution to national totals comparatively small. For example, over the study years, the NCRP admissions covered more than 95% of admissions in the NPS. Non-participation by the smaller population states would not likely affect the distributions of people in prison by race and Hispanic origin by crime. The authors conducted sensitivity analyses to determine the effects of state participation on the race and Hispanic origin by offense distribution of individuals in prison. This was done by dropping states that did not participate in some years from the years in which they participated and comparing race and distributions. The effects were minor and at most amounted to a maximum of one percentage point difference between the estimates with the states’ inclusion versus omission.

**Age of individuals in prison.** The authors used NCRP data to generate race-specific age distributions of state prison populations in 2000 and 2019. As with the offense-specific estimates, the NCRP counts were weighted up to NPS (or national) totals.

**Arrests by offense and race.** The underlying source of data is the Federal Bureau of Investigation's (FBI) arrest counts by offense, race and Hispanic origin, sex, and age collected from local law enforcement agencies through the Uniform Crime Reporting Program (UCR). The arrest data are known to be incomplete due to non-response. The report methodology used two sources derived from the raw FBI arrest data and applied weighting methodologies to the data to generate national-level estimates of arrests by race and offense. The sources and weighting methods are:

- + Data from BJS's Arrest Data Analysis Tool; see <https://www.bjs.gov/index.cfm?ty=datool&surl=/arrests/index.cfm>

To address non-response, the BJS applies a weighting methodology similar to the methodology used by the FBI to provide national arrest estimates by offense, race, sex, and age. The BJS methodology stratifies law enforcement agencies into population groups and weights the raw arrest counts by a factor equal to the total population of all agencies within a stratum divided by the population of all responding (reporting) agencies within a stratum. To the totals obtained from this first step, the BJS then weights the stratum-specific offense, race and Hispanic origin, sex, and age estimates by the ratio of the FBI's national arrest estimate divided by the totals BJS obtains for each offense category. More details about the BJS methodology are available at: <https://www.bjs.gov/index.cfm?ty=datool&surl=/arrests/index.cfm>

- + Because the BJS estimates run through 2014, the authors had to update them with data for more recent years (2015-2020) using Jacob Kaplan's concatenated arrests by race, sex, and age data files.<sup>4</sup> Kaplan harmonizes the multiple years of FBI data into a common format. The authors of this report were unable to replicate the BJS methodology exactly but created a weight that was similar to the weight used by BJS. The authors stratified law enforcement agencies by the population groups used by BJS and then created a weight by dividing the total number of law enforcement agencies by the number of agencies that reported any arrests. That weight was applied to the total number of arrests by offense, race, sex, and age for each population group, as reported in the Kaplan data. The authors generated the final weighted counts of arrests by summing the weighted counts across population groups and compared their estimates with the BJS estimates for the years 2000-2014, finding only small differences. For example, the difference between the two estimates of aggravated assaults for Black individuals differed by about 0.5%, and arrests for robbery by 2.1%.
- + Due to data limitations, the report does not include arrest estimates for Hispanic individuals. Prior to 2013, the UCR did not provide any data on the Hispanic origin of persons arrested. Beginning in 2013, it added data on the ethnicity of persons arrested – for persons of Hispanic or Latino origin. In tables showing these data, the FBI included a cautionary footnote about the

data on ethnic origin, writing “[t]he ethnicity totals are representative of those agencies that provided ethnicity breakdowns. Not all agencies provide ethnicity; therefore, the race and ethnicity totals will not be equal.” From 2013 to 2016, data on Hispanic origin of persons arrested covered between 53% and 78% of all arrests reported. This coverage varied by crime type. Due to the absence of data on the Hispanic origin of persons arrested for most of the study period and due to the under-coverage of arrests, the authors did not analyze arrest data by Hispanic origin of persons arrested.

**Race of offenders as reported by victims of nonfatal violent crimes.** The report used BJS’s National Crime Victimization Survey (NCVS) data to generate offender counts by race and offense category. The NCVS is a national probability sample of more than 200,000 individuals that measures criminal victimization. Since its inception in 1973, the NCVS has asked victims of violent crimes to report on the characteristics of their assailants in crimes in which the victims were present. The estimates of the race of offenders have proven to be reliable, aligning with other measures of the characteristics of offenders.<sup>5</sup> For example, BJS reports from the NCVS estimates show that violent victimizations are primarily intra-racial, and that the majority of victims report their perpetrators to be of the same race.<sup>6</sup>

The estimates of the number of offenders by race and type of offense used in this report were developed by weighting the incidents by the NCVS incident weight and by the number of offenders involved in a criminal victimization as reported by the victim. The number of offenders in an incident was capped at 10 if more than 10 were reported. The incident weights for the personal violent crimes described in this study is derived by dividing the “person weight” of a victim by the total number of persons victimized during an incident, as reported by the respondent. The person weight provides an estimate of the population represented by each person in the sample. The estimated number of offenders was obtained by multiplying the incident weight by the number of offenders in an incident and classifying these estimated counts by race and offense. These were compiled and used in generating the race-specific probation and parole rates.

**Individuals on parole by race and Hispanic origin.** The authors used data from BJS’s annual *Probation & Parole in the U.S.* reports, which provide annual estimates of the number of individuals on parole and the percent of individuals on parole by race and Hispanic origin, as defined and reported in state and local agencies’ administrative systems. The percent distribution of parolees by race is derived from agencies that reported data by race. To account for non-response, the authors generated national-level estimates of the number of individuals on parole by race and Hispanic origin by applying the percentages of individuals by race and Hispanic origin to the total parole population provided in annual reports.

**Adult population by race and Hispanic origin.** The report used the National Center for Health Statistics’ Bridged-Race Population (BRP) Estimates data to generate estimates of the U.S. adult residential population of non-Hispanic White, non-Hispanic Black, and Hispanic (of any race)

individuals, which were used as denominators in calculating adult imprisonment rates and in describing growth in population. The BRP provides annual estimates of the U.S. adult residential population by race and Hispanic origin as of July 1st of each year. These estimates “bridge” the 31 race categories used in Census 2000, as specified by the 1997 Office of Management and Budget (OMB) standards for the collection of data on race and ethnicity, to the four race categories used prior to 2000 (i.e., Asian or Pacific Islander, Black or African American, American Indian or Alaska Native, and White).<sup>7</sup> A major challenge in bridging the pre- and post-2000 data was deciding how to allocate persons who report belonging to more than one racial category into a single racial category. NCHS developed methods to bridge the multiple race populations to single race categories, using demographic and contextual measures of population at the person and county level and regression methods to develop allocation probabilities.<sup>8</sup>

## METHODS

### Measures of race and impacts on disparity ratios

The statistics on racial disparities reported in this paper were developed from the administrative data reported by state departments of corrections officials to BJS in the NPS, NCRP, and parole surveys. The BJS surveys ask respondents to provide data on race and ethnicity according to OMB’s 1997 guidance, which pertains explicitly to federal agencies but not directly to the state agencies that submit data to BJS.<sup>9</sup> The OMB guidance on race and ethnicity starts with the premise that these identities are self-determined and that a person may self-identify in more than one category. OMB specifies a preference for collecting data on race and ethnicity separately. If separate race and ethnic categories are used, the minimum designations for race are: American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander; Black or African American; and White. The minimum designations for ethnicity are Hispanic origin or not of Hispanic origin. However, BJS’s NPS and parole surveys provide aggregate counts of individuals, using what OMB calls a “combined format” to collect data on race and ethnicity. OMB’s minimum acceptable categories for collecting data on race and ethnicity in a combined format are:

- + American Indian or Alaska Native, not of Hispanic origin;
- + Asian or Pacific Islander, not of Hispanic origin;
- + Black, not of Hispanic origin;
- + Hispanic; and
- + White, not of Hispanic origin.

Because individuals may self-identify as belonging to two or more races, in reporting data on race and ethnicity a category of “two or more races” is included in statistical reports.

Respondents provide BJS data for individuals of Hispanic origin regardless of their race; for non-Hispanic individuals, data include the number of individuals who report belonging to a single race

group and those who report belonging to two or more races. As BJS has reported, the data in state administrative data system do not fully align with OMB standards.<sup>10</sup>

To comply with OMB reporting standards on race and ethnicity, BJS adjusts the administrative data on the race and Hispanic origin of people in prison to the OMB standards. The BJS adjustment uses survey self-report data on race and ethnicity from its periodic surveys of prisoners to calculate a ratio of the number of persons by race and ethnicity in the self-report data in the specific year(s) in which the self-report surveys were conducted, and then applies this ratio to subsequent years of administrative data until the next self-report survey. Specifically, the adjustment ratio is multiplied by the distribution of persons by race and Hispanic origin as reported in the administrative data.

The authors did not adjust the data in the manner that BJS did, in part because they did not have access to all of the data that BJS used in making its adjustments. This decision presents the possibility that the report's estimates of disparity may differ from those implicit in BJS reports on prisoners. To address this possibility, the study compared the author's estimates of Black-White disparity ratios for prisoners with those implicit in BJS's reports on prisoners.<sup>11</sup> The results showed:

For the Black-White racial imprisonment rate disparity, the trends and turning points in the BJS reports and in this report are similar. The overall level of disparity implicit in the BJS reports is somewhat higher than what is reported in this study, but the difference between the two sets of estimates does not exceed one point.

The reasons for the differences in levels of disparity arise from how the BJS adjustment reallocates individuals in prison who are reported as White, Black, Hispanic, and of two or more races in the state administrative data systems. The major adjustments involve allocating individuals from a single race category into the two or more races category and allocating Black and White individuals who are of Hispanic origin from a race category into the Hispanic ethnicity category. The state administrative systems rarely report persons of two or more races. In the NPS data, the total number of persons reported as belonging to two or more races for the period 2000 through 2020 was 0.03% (or three-one hundreds of one percent). By comparison, in BJS's 2016 Survey of Prison Inmates, approximately 11% of respondents (weighted to national totals) reported belonging to two or more races. Analogously, the administrative systems classify many persons of Hispanic origin only according to a race category. This results in the administrative data underestimating persons of Hispanic origin relative to BJS's estimates.

The BJS adjustments reallocate approximately comparable proportions of Black and White individuals into other race or ethnicity categories. This explains why the Black-White disparity ratios reported here do not differ appreciably from those implicit in BJS's reports.

The use of administrative data to measure disparity has been rightly criticized for overlooking the multidimensional contexts of race (e.g., perceived discrimination and skin tone). Such arguments

are credible, as different aspects of race shape an individual’s life experiences, including health outcomes, family income, and job prospects.<sup>12</sup> Recognition of this reality largely explains the federal government’s move toward self-identification data collection standards.<sup>13</sup> However, while self-reported race data provide valuable insights, they do not reflect the perceptions of others and the actions that others take based upon their perceptions. Thus, if physical appearance is the basis of discrimination,<sup>14</sup> self-reported data are not necessarily the most appropriate data for studying racial disparities. Instead, data capturing the perspective of others would be better suited. In support of this notion, the authors agree with scholars<sup>15</sup> who contend that external classifications better represent discrimination based on appearance versus self-identification and with conclusions from evaluation of measures of race that inequality is related to how one is perceived by others.<sup>16</sup>

In sum, despite the value of arguments for self-identification of race and ethnicity, on balance the weight of the empirical evidence suggests that self-reported data more accurately reflect intrinsic processes but not necessarily racialized outcomes—at least in the context of system-level outcomes. With these considerations, in addition to the impacts of the adjustments that BJS makes, the report focuses on trends derived from administrative data sources.

### Decomposing the contribution of resident population to imprisonment rates

To determine the relative contributions of change in resident population and change in the number of imprisoned people to change in race-specific imprisonment rates, the authors used the Oaxaca-Blinder decomposition method. To start, the imprisonment rate is defined as the number of imprisoned people divided by the adult resident population; for example, for Black individuals, the imprisonment rate at time  $t$  equals  $BR_t = BPRIS_t/BPOP_t$ . (For White individuals, the “B” prefix would be replaced by a “W” or “H”, respectively.) The difference in imprisonment rates between two periods, e.g., for Black individuals, equals:

$$BR_t - BR_0 = BPRIS_t/BPOP_t - BPRIS_0/BPOP_0$$

where the subscript  $0$  indicates the starting period.

This difference can be decomposed into two components: (1) the amount due to population change and (2) the amount due to change in the number of imprisoned people, or

$$BR_t - BR_0 = BP_t * \left( \frac{1}{BPOP_t} - \frac{1}{BPOP_0} \right) + BPOP_0 * (BP_t - BP_0)$$

where the first term on the right side gives an amount due to population change and the second term an amount due to change in imprisoned people from the respective bases. Because the base against which change is determined matters, the decomposition method was implemented twice for each race group. That is, the authors calculated the contribution of population change from a base of the prison population in the end year (e.g., 2020) and from the base year (e.g., 2000), and then took the average across these two calculations.<sup>17</sup>



## Growth-rate adjusted estimates of length of stay

Estimated length of stay was calculated using the stock-flow ratio of the number of imprisoned people to the number of admissions. Adjusted for the growth rate in the prison population using Patterson's indirect estimator.<sup>18</sup>

$$elos \sim \frac{1}{[b*(1-rpa)]}$$

Where mean expected length of stay (elos) equals the reciprocal of the admission rate ( $b$ ) adjusted by the growth rate  $\text{\textcircled{R}}$  of the stock prison population applied to mean time served by the stock population.

## Decomposing the contribution of admissions and length of stay to differences in imprisonment rates

The authors used the same method to decompose the contributions of admissions and length of stay to racial differences in imprisonment rates as they used to decompose the contributions of the U.S. adult resident population and number of imprisoned people to change in imprisonment rates. However, in the analysis of admissions and length of stay, the imprisonment rate start was defined as the product of the admissions rate (per population) times the stock-flow ratio estimate of length of stay of imprisoned people to admissions. For example, the Black imprisonment rate (BINC) is the product of the Black admissions rate times expected length of stay, or:

$$BINC = \frac{BA}{BPOP} * \frac{BPRIS}{BA}$$

Where BINC is the Black imprisonment rate (the number of Black people in prison divided by the Black U.S. adult resident population); the Black admissions rate equals the number of Black individuals admitted into prison (BA) divided by the Black U.S. adult resident population (BPOP); and estimated mean length of stay for Black individuals is the ratio of the number of Black prisoners (BPRIS) to Black admissions. For White people in prison, the study used the same formula but with the data for White individuals (WINC).

The difference in imprisonment rates is defined as:

$$BINC - WINC = \frac{BA}{BPOP} * \frac{BPRIS}{BA} - \frac{WA}{WPOP} * \frac{WPRIS}{WA}, \text{ or}$$

$$BINC - WINC = \frac{BA}{BPOP} * \left( \frac{BPRIS}{BA} - \frac{WPRIS}{WA} \right) + \frac{WPRIS}{WA} \left( \frac{BA}{BPOP} - \frac{WA}{WPOP} \right)$$

The first term on the right gives the contribution of racial differences in length of stay to the overall racial difference in imprisonment rates, and the second gives the contribution of differences in admissions. As with the analysis of population, the analysis included two bases and averaged the effects of length of stay and admissions.



The report used a similar approach as in the decomposition of admissions to decompose the differences in Black-White imprisonment rates due to differences in their respective age distributions in 2000 and 2019. In the decomposition of imprisonment rate differences arising from age differences in the resident population, first the difference in imprisonment rates is multiplied by the White population share and the difference in Black-White population shares by the Black imprisonment rate. Second, the rates and population shares are reversed. The average of the two results for imprisonment rate differences and age distribution differences is then taken to generate the reported results.

## ENDNOTES

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<sup>1</sup> CCJ uses person-first terminology. When referring to data sets from the National Prisoners Statistics (NPS) and the National Corrections Reporting Program (NCRP), however, we use their terminology, including "prisoner."

<sup>2</sup> United States Department of Justice. Office of Justice Programs. Bureau of Justice Statistics. (2021). *National Prisoner Statistics, 1978-2020* (ICPSR 38249). Ann Arbor, MI: Inter-university Consortium for Political and Social Research. <https://doi.org/10.3886/ICPSR38249.v1>

<sup>3</sup> United States Department of Justice. Office of Justice Programs. Bureau of Justice Statistics. (2021). *National Corrections Reporting Program, 1991-2019: Selected Variables* (ICPSR 38047). Ann Arbor, MI: Inter-university Consortium for Political and Social Research. <https://doi.org/10.3886/ICPSR38047.v1>

<sup>4</sup> Kaplan, J. (2021). *Jacob Kaplan's Concatenated Files: Uniform Crime Reporting (UCR) Program Data: Arrests by Age, Sex, and Race, 1974-2020*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research. <https://doi.org/10.3886/E102263V14>

<sup>5</sup> Mosher, C., & Miethe, T. (2015). Data bases and statistical systems: Crime. In J.D. Wright (Ed.), *International Encyclopedia of the Social and Behavioral Sciences* (Second Edition), pp. 712-716. Oxford: Elsevier.

<sup>6</sup> Morgan, R. (2017). *Race and hispanic origin of victims and offenders 2012-2015* (NCJ 250747). Washington, DC: Bureau of Justice Statistics. <https://bjs.ojp.gov/content/pub/pdf/rhovo1215.pdf>; Rennison, C. (2001). *Violent victimization and race, 1993-98* (NCJ 176354). Washington, DC: Bureau of Justice Statistics.

<https://bjs.ojp.gov/content/pub/pdf/vvr98.pdf>; For studies that use NCVS to analyze offenders by race, see: Beck, A.J., & Blumstein, A. (2018). Racial disproportionality in U.S. state prisons: Accounting for the effects of racial and ethnic differences in criminal involvement, arrests, sentencing, and time served. *Journal of Quantitative Criminology*, 34, 853-883. <https://doi.org/10.1007/s10940-017-9357-6>

<sup>7</sup> Office of Management and Budget. (1997). Revisions to the standards for classification of federal data on race and ethnicity. *OMB Statistical Policy Directive 15*. Federal Register Notice. [https://obamawhitehouse.archives.gov/omb/fedreg\\_1997standards](https://obamawhitehouse.archives.gov/omb/fedreg_1997standards)

<sup>8</sup> For additional information about how NCHS produces the bridged-race population estimates, see: Ingram, D.D., Parker, J.D., Schenker, N., Weed, J.A., ... & Madans, J.H. (2003). United States Census 2000 population with bridged race categories. National Center for Health Statistics. *Vital Health Statistics Series*, 2(135), 1-55. <https://pubmed.ncbi.nlm.nih.gov/14556588/>

<sup>9</sup> See: Office of Management and Budget (1997), cited above.

<sup>10</sup> Carson, E.A. (2018). *Prisoners in 2016* (NCJ 251149). Washington, DC: Bureau of Justice Statistics. <https://bjs.ojp.gov/content/pub/pdf/p16.pdf>

<sup>11</sup> Sabol, W. J., & Johnson, T. (2019). *Measuring race in correctional populations: Impacts and implications*. Georgia State University, unpublished manuscript.

<sup>12</sup> Campbell, M. E., & Troyer, L. (2007). The implications of racial misclassification by observers. *American Sociological Review*, 72(5), 750-765. <https://doi.org/10.1177/000312240707200505>; Campbell, M. E., & Troyer, L. (2011). Further data on misclassification: A reply to Cheng and Powell. *American Sociological Review*, 76(2), 356-364.

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- <sup>14</sup> Sollors, W. (2002). What race are you? in J. Perlmann and M.C. Waters (Eds.), *The New Race Question: How the Census Counts Multiracial Individuals* (pp. 263 –268). Russell Sage.
- <sup>15</sup> Telles, E. E., & Lim, N. (1998). Does it matter who answers the race question? Racial classification and income inequality in Brazil. *Demography*, 35(4), 465-474. <https://pubmed.ncbi.nlm.nih.gov/9850470/>
- <sup>16</sup> Saperstein, A., Kizer, J. M., & Penner, A. M. (2016). Making the most of multiple measures: Disentangling the effects of different dimensions of race in survey research. *American Behavioral Scientist*, 60(4), 519-537. <https://doi.org/10.1177/0002764215613399>
- <sup>17</sup> The approach of averaging across the two calculations to take into account the baseline effects is similar to that outlined in: Enders, W., Pecorino, P., & Souto, A. (2019). Racial disparity in U.S. imprisonment across states and over time. *Journal of Quantitative Criminology*, 35, 365-392. <http://dx.doi.org/10.2139/ssrn.3053020>
- <sup>18</sup> For more on this, see: Patterson, E.J., & Preston, S.H. (2008). Estimating mean length of stay in prison: Methods and applications. *Journal of Quantitative Criminology*, 24, 33-49. <https://link.springer.com/article/10.1007/s10940-007-9037-z>