Updating the New York City Criminal Justice Agency Release Assessment

Maintaining High Court Appearance Rates, Reducing Unnecessary Pretrial Detention, and Reducing Disparity

Luminosity & the University of Chicago's Crime Lab New York

June 2020

PREFACE

The data used in these analyses were provided by the New York State Division of Criminal Justice Services (DCJS), New York City Department of Correction (DOC), and the New York City Criminal Justice Agency. The opinions, findings, and conclusions expressed in this report are those of the authors and not those of DCJS or New York City. New York State, DCJS, nor New York City assumes liability for its contents or use thereof.

Contents

INTRODUCTION

The New York City Criminal Justice Agency, Inc. (CJA) is a not-for-profit corporation serving New York City's criminal justice system under contract with the Mayor's Office of Criminal Justice (MOCJ). CJA was established in 1973 (as the Pretrial Services Agency) to provide pretrial services as pioneered and tested by the Vera Institute of Justice's Manhattan Bail Project in the early 1960s.

The mission of CJA is to assist the courts and the City in reducing unnecessary pretrial detention. In accordance with this mission, CJA provides the following primary services:

1. Conducts pre-arraignment interviews, performs assessments, and makes release recommendations to the court regarding the likelihood of continued appearance in court if the person is released in lieu of monetary bail;
2. Notifies released individuals of upcoming court dates to reduce the rate of non-appearance;
3. Operates Supervised Release programs to serve eligible individuals who would otherwise be held in jail;
4. Assists arrested individuals and their families in navigating bail payment with the intention of avoiding admissions to DOC facilities; and
5. Provides information and research services to criminal justice policy makers, City officials, and the public.

Consistent with the first primary service – conducting pre-arraignment interviews, performing assessments, and making release recommendations to the court – CJA interviews nearly all people who are held in NYC police detention prior to arraignment to determine their ties to the community. CJA attempts to verify the information provided during the interview, gathers prior court appearance and criminal history information, completes a research-based assessment of the likelihood of appearance, and makes a release recommendation. Personal and community ties related information, the assessment results, and the release recommendation are compiled in a report known as the CJA Release Assessment. The CJA Release Assessment is provided at arraignment to the court, defense, and prosecution, and is intended to assist the court in its determination of the likelihood that a person will return for court appearances and whether the individual should be released on their own recognizance (ROR), with nonmonetary conditions, or on bail. The assessment contains objective and research-based information designed to support, not replace, judicial discretion and decision-making.

The CJA Release Assessment that was in use until November 2019 was last updated in 2003 (henceforth referred to as the "2003 CJA Release Assessment"). As a result, CJA, with support from MOCJ, sought to update the assessment. The update was spurred in part by recognition of the changes in NYC's social conditions and justice system practices, and by the desire to benefit from the breadth and wealth of knowledge accumulated since the development of the 2003 CJA Release Assessment across many disciplines including social science, data science, and behavioral science.

The overarching goals of updating the assessment were to (1) maintain the current high court appearance rates in New York City for people released pretrial, (2) reduce the use of pretrial detention when possible, and (3) reduce racial and other disparities in pretrial settings. The following guiding principles steered the assessment update process: the assessment must be evidence-based and informed by data science; it should be developed in collaboration with judges, court actors, advocates, and affected communities and individuals; and it must be transparent and validated.

With these goals and guiding principles in mind, two independent research organizations – Luminosity, led by Dr. Marie VanNostrand, and the University of Chicago's Crime Lab New York (CLNY), led by Dr. Jens Ludwig – were retained to lead the development of the updated assessment. Luminosity is a nationally recognized expert in the pretrial stage of the justice system and possesses decades of experience using traditional social science research methods to advance pretrial justice policies and practices. CLNY leverages data science to solve pressing social problems and is dedicated to the design, testing, and scaling of promising programs and policies to reduce crime and violence in NYC. Engaging two independent research organizations with different areas of expertise to analyze the data provided a unique opportunity to benefit from increased transparency and independently validated results. The pioneering behavioral science design firm ideas42 was also retained to ensure the development and design processes were informed by behavioral science. Together, Luminosity, CLNY, ideas42, and CJA, with support from MOCJ, formed a Research Partnership (see Appendix A for more detailed descriptions of each organization), which led the process of updating the CJA Release Assessment (henceforth referred to as the "updated CJA Release Assessment").

The Research Partnership worked with judges, court actors, advocates, and affected communities and individuals throughout the entire development process. A public meeting was held at the beginning of the process to share information about the planned research and to solicit feedback. Judges, prosecutors, and defenders were consulted early on to learn more about how the 2003 CJA Release Assessment was used and to better understand the existing pretrial release decision-making process. Feedback was received from judges, prosecutors, defenders, and other criminal justice system actors as findings were shared throughout the research process. The Research Partnership also engaged in extensive outreach with community groups and affected individuals to solicit input, share findings, and provide updates on the development process.

The update process further benefitted from the creation of and consultation with an expert Research Advisory Council (RAC). The RAC members represent the areas of criminal justice, economics, addressing algorithmic bias, machine learning, and computer science, and hold varied perspectives on release assessments (see Appendix B for more information about the RAC members). The RAC reviewed analysis methods and results; requested additional analysis to be conducted; consulted on how the assessment might impact racial, ethnic, and other groups; and provided overall guidance and technical assistance. Partnering with the RAC – as well as extensive stakeholder engagement – had the added, intended benefit of increasing transparency when developing the updated CJA Release Assessment.

It is important to note that, as the revision of the CJA Release Assessment neared completion, the New York State legislature passed sweeping criminal justice bail reform legislation. This reform – effective January 1, 2020 – eliminates the use of money bail for most misdemeanor and non-violent felony offenses, specifies the presumptive use of appearance tickets by law enforcement officers for many charges, and includes specifications for the use of assessment tools in release decisions. Specifically, a tool used for considering a person's pretrial release or bail must be (1) "designed and implemented in a way that ensures the results are free from discrimination on the basis of race, national origin, sex, or any other protected class" and (2) be "empirically validated and regularly revalidated." As will be detailed in this report, decisions were made and analysis undertaken to ensure that the updated CJA Release Assessment is compliant with these standards, in addition to being consistent with the update's overarching goals and guiding principles.

The 2003 CJA Release Assessment was phased out of use at the end of 2019, and the updated CJA Release Assessment was put into use in New York City courtrooms prior to January 1, 2020. This report provides an overview of the building, testing, and performance of the updated CJA Release Assessment in relation to the goals, guiding principles, and legislative mandates discussed above. When appropriate, comparisons are made between the 2003 and updated CJA Release Assessments. The performance of the updated CJA Release Assessment for groups (i.e., race/ethnicity and sex) is also examined. The report concludes with a discussion of the redesigned updated CJA Release Assessment report provided in hard copy to judges and court actors at arraignment.[1]

[1] During the COVID-19 emergency, New York courts drastically scaled back operations and converted to virtual appearances for essential matters. During this period, the courts temporarily paused CJA pre-arraignment interviews and Release Assessment reports.

SAMPLE FOR ANALYSIS

Identifying the sample for analysis and generating a corresponding research dataset began with the compilation of data files. This multi-step process required cooperation from several local and state agencies and data sources. CJA generated an initial data file containing information for all summary arrests (people arrested and held in custody until arraignment) between January 1, 2009 and December 31, 2015. Each arrest record is known as an arrest cycle,[2] representing a single arrest for a person and including all charges that stemmed from the arrest. The CJA data file served as the primary file to which all other data files were matched.

The CJA data file includes information on individuals' community ties collected through pretrial interviews; arrest cycle related charge information sourced from New York City Police Department (NYPD) data; and court case related information (e.g., arraignment outcomes, charge resolutions, bench warrants) originating from the New York State Office of Court Administration (OCA). In addition, the New York City Department of Correction (DOC) compiled a data file containing records (admission and release related data) for all people admitted to the DOC during the same period.

The data files compiled by CJA and DOC were then sent to the New York State Division of Criminal Justice Services (DCJS). Using the person identifiers contained in the CJA data file, DCJS extracted the corresponding criminal histories from their Computerized Criminal History (CCH) system. DCJS then generated pseudo person and record identifiers needed for record linking, replaced the true identifiers with the pseudo identifiers, and removed all remaining personally identifiable information from all files. The CJA, DOC, and DCJS de-identified data files were then sent to the research teams for further processing.

DATASET

The research teams collaborated to create a dataset for analysis using the CJA, DOC, and DCJS data files. The preliminary dataset included 1,854,824 records, each representing an arrest cycle. The teams cleaned the data, resulting in the removal of 221,643 arrest cycles due to duplicate or incomplete information. Then, all arrest cycles that did not continue past arraignment were removed (616,425 records). In addition, all arrest cycles where the most serious charge at the time of arraignment was either a violation, infraction, or the charge severity was unknown were removed (16,587 records). The final dataset used for analysis (a.k.a. analysis file) includes 1,000,169 records that represent arrest cycles with arrest dates between January 1, 2009 and December 31, 2015 that were continued beyond arraignment, and the most serious charge at the time of arraignment was a felony or misdemeanor.

The analysis file was partitioned by the research teams into five subsets: train, test, imputation, validation, and 2015. The partitioning allows for the use of different subsets in specific steps of

[2] Arrest cycle serves as the unit of analysis, with each arrest cycle representing one row in the dataset.

developing, testing, and validating the updated CJA Release Assessment, as well as assessing the performance of the 2003 CJA Release Assessment. Arrest cycles were randomly assigned to their respective subsets. The train and imputation subsets each contain 50% of the arrest cycles from 2009 to 2013; the test and validation subsets each contain 50% of the arrest cycles from 2014; and the 2015 subset contains all of the arrest cycles from 2015.[3] More detailed information about each subset is contained in Table 1 below.

Table 1. Description of Subsets

Subset	N	Percent	Timeframe	Purpose
Train	363,732	36.4	2009-2013	For building candidate models
Test	70,597	7.1	2014	For evaluating candidate model performance
Imputation	363,882	36.4	2009-2013	For building unrestricted imputation models (to impute unobserved outcomes for population not at risk [i.e., counterfactual outcomes for individuals not released pretrial])
Validation	70,250	7.0	2014	For computing final model metrics
2015	131,708	13.2	2015	Not included to prevent truncation bias due to limited tracking period (6 months following December 31 of the arrest year compared to 18 months for the years 2009 to 2014)

MEASURES

Before beginning any analysis, the research teams identified the dependent (outcome) variable and the data available for the creation of potential independent (risk factor) variables. In addition, the teams created measures of charge severity, race/ethnicity, and sex for use in determining how the 2003 and updated CJA Release Assessments perform for these different groups. Specifically, race/ethnicity and sex measures are used to establish the degree to which the updated CJA Release Assessment identifies risk of FTA equally well for the various groups. Charge severity – but not race/ethnicity or sex – is also used in combination with the assessment score to generate the release recommendation. All frequencies presented in this section (for charge severity, race/ethnicity, and sex) are provided for the entire analysis file.

[3] The process of removing arrest cycles where the most serious charge at the time of arraignment was either a violation, infraction, or the charge severity was unknown took place after the analysis file was partitioned into subsets. As a result, despite being randomly assigned to their respective subsets, the number of arrest cycles is slightly different between the corresponding subsets.

Charge Severity

When considering all charges related to an arrest cycle, charge severity is determined by identifying the most serious charge at arraignment – violent felony offense (VFO),[4] felony non-VFO, or misdemeanor. If one or more charge is a VFO, the charge severity is VFO. If no charge is a VFO but one or more charges is a felony, the charge severity is felony non-VFO. If no charge is a felony but one or more charges is a misdemeanor, the charge severity is misdemeanor. The charge severity distribution is VFO 12.7%, felony non-VFO 20.6%, and misdemeanor 66.7%.

Race/Ethnicity

During the CJA interview, people are asked to voluntarily self-report both their race and ethnicity for purposes of evaluating overall trends and impacts. The possible responses for race are White, Black, Asian, American Indian, or Other, and the possible responses for ethnicity are Hispanic or non-Hispanic. To determine how most appropriately to create a measure for research purposes that captures dimensions of both race and ethnicity, the Research Partnership examined several options in consultation with the Research Advisory Council. The RAC advised that the most appropriate measurement of race and ethnicity, in this context, is to use an encoding that represents the race/ethnicity as it would likely appear to a court actor (i.e., Black, Hispanic, White). This standard collapses the different race/ethnicity combinations into the groups as shown in Table 2 below. The race/ethnicity of Asian, American Indian, and Other non-Hispanic groups on their own constitute a small percentage of the sample. Therefore, these race/ethnicity groups are collapsed into Other race/ethnicity (108 arrests cycles with unknown race/ethnicity are excluded from the distribution).

Table 2. Distribution of Race/Ethnicity

Race/ethnicity combinations	N	Percent	Collapsed race/ethnicity	N	Percent
Black non-Hispanic	495,260	49.5	Black	561,105	56.1
Black Hispanic	65,845	6.6			
White Hispanic	222,885	22.3	Hispanic	268,920	26.9
Other Hispanic	46,035	4.6			
White non-Hispanic	115,607	11.6	White	115,607	11.6
Asian	32,750	3.3	Other	54,429	5.4
American Indian	1,068	0.1			
Other non-Hispanic	20,611	2.1			

[4] VFO includes all offenses specified as VFOs per NYS Penal Law section 70.02, as well as certain VFO-like Class A offenses, as defined by DCJS. The rationale for these charges being treated like VFOs is explained on page 2 of the document General Law File Information (https://www.criminaljustice.ny.gov/crimnet/clf/rel-db/general_law_file_info.pdf) and the exact charges can be found in the Excel file Listing of NYS Laws (https://www.criminaljustice.ny.gov/crimnet/clf/rel-db/Excel-Listing-of-NYS-Laws.xls).

Sex

An indicator of sex is contained in the NYPD data and is provided as part of the arrest cycle information for each person. Based on this measure, 82.9% of the individuals in the sample are male and 17.1% are female.

Outcome Variable

In New York, the pretrial release decision is driven primarily by the need to assure that individuals appear for all required court hearings until all charges related to their court case(s) are resolved. As a result, the outcome variable of interest is failure to appear (FTA), which is provided in the CJA data file. Per the CJA definition, a person fails to appear when they do not appear for a required court hearing related to the arrest cycle, after arraignment and prior to the end of the tracking period, and the court issues a non-stayed bench warrant. Arrest cycles are tracked until the date when all related charges are resolved or 18 months following December 31st of the arrest year, whichever occurs first. Creating alternate methods for measuring FTA, such as considering stayed bench warrants or circumstances when a person returns voluntarily to court soon after the missed hearing, is not feasible with the data provided for analysis.

Potential Risk Factor Variables

Potential risk factor variables are created using information contained in the analysis file. These factors are grouped into four domains: prior convictions, prior bench warrants, pending cases, and community ties. The DCJS data file provides the prior convictions, prior bench warrants, and pending cases data. Community ties data describe the self-reported state of the individuals' circumstances at the time of the interview (e.g., length of residence, employment status, has a home or mobile phone) and are available in the CJA data file.

Expunging Marihuana Arrest Cycles

After the building and testing of the statistical model used to update the CJA Release Assessment were complete, but before its full implementation and operation, the New York State legislature passed a law that requires expungement of all arrest cycles where the resulting convictions were only for two specific marihuana charges, Penal Law § 221.10 and § 221.05. The development of the updated CJA Release Assessment model was completed prior to passage of this law, therefore the change in the law did not impact the statistical model.[5] For this reason, the results pertaining to the

[5] Within the context of the development of the updated CJA Release Assessment, the impact of the marihuana expungement law is relatively small. Applying marihuana expungement impacts the release recommendation of the updated CJA Release Assessment in less than 1% of arrest cycles. Given that marihuana expungement reduces potential criminal history factors, it can only result in a less restrictive recommendation.

statistical model itself, including comparisons to the 2003 CJA Release assessment model, are based on datasets that do not implement marihuana expungement.[6]

However, consistent with the updated New York State marihuana law, the updated CJA Release Assessment in practice excludes relevant past marihuana convictions and associated warrant history. For this reason, findings related to how the updated CJA Release Assessment likely will perform in practice, such as the computation of estimated appearance rates and release recommendations, are based on datasets that implement marihuana expungement.[7] By employing the marihuana expungement, the findings better represent how the updated CJA Release Assessment will operate in practice.

[6] This includes all results in the sections entitled "2003 CJA Release Assessment", "Identifying Candidate Risk Factors", "Building and Testing the Updated CJA Release Assessment", "Updated CJA Release Assessment: Performance Comparison", "Appendix D", and "Appendix E", as well as the comparison related results in the section entitled "Updated CJA Release Assessment: Performance by Race/Ethnicity and Sex".

[7] This includes all results in the sections entitled "Updated CJA Release Assessment: Estimated Appearance Rates" and "Updated CJA Release Assessment: Release Recommendations", and the non-comparison results in the section entitled "Updated CJA Release Assessment: Performance by Race/Ethnicity and Sex".

EXAMINATION OF THE 2003 CJA RELEASE ASSESSMENT

Creating an updated CJA Release Assessment begins with an examination of the 2003 CJA Release Assessment, which ceased to be used before January 2020. This includes an examination of the predictive validity and resulting release recommendations, as well as the identification of other critical measures (i.e., release status and failure to appear rates). These analyses are conducted to establish baseline measures to which the updated CJA Release Assessment will be compared. The 2014 test subset is used for these analyses.

The 2003 CJA Release Assessment was developed after extensive research conducted by CJA's research department.[8] That assessment utilized the six factors listed below, which were weighted based on the strength of the relationship between the factor and failure to appear. The calculated score ranged from -13 to +12 and, in some instances, the weighting varied if the information was verified.[9]

1. Does the defendant have a working telephone in residence/cellphone?
2. Does the defendant report a NYC area address?
3. Is the defendant employed, or in school or training program, full time?
4. Does the defendant expect someone at arraignment?
5. Does prior warrant equal zero?
6. Does open case equal zero?

The score represented the likelihood of appearing for all court hearings (as measured by the absence of a non-stayed bench warrant) if the person was released on their own recognizance. The higher the score, the more likely the person was to appear. The scores on the 2003 CJA Release Assessment were grouped into three categories of recommendations to provide to the court: Recommended for ROR (low risk: +7 to +12 points); Moderate risk for ROR (+3 to +6 points), and Not recommended for ROR (high risk: -13 to +2 points). In addition to score results, some individuals received a Not recommended for ROR recommendation based on a policy rationale (e.g., active bench warrant, bail-jumping charge). Finally, a recommendation was not made when the assessment could not be completed or was prepared For Information Only due to murder or escape related charges or offenses that occurred while in-custody (No recommendation).

The assessment results (i.e., factors, responses, weights, and total score), personal and community ties related information, and the release recommendation were compiled in the CJA Release

[8] See Qudsia Siddiqi, Ph.D. (2002) Prediction of Pretrial Failure to Appear and an Alternative Pretrial Release Risk-Classification Scheme in New York City: A Reassessment Study and Qudsia Siddiqi, Ph.D. (2003) An Examination of the Existing and New Pretrial Release Recommendation Schemes in New York City: A Pre-Implementation Analysis.

[9] Qudsia Siddiqi, Ph.D. (2007) Research Brief No. 13: An Evaluation of CJA's New Release-Recommendation System.

Assessment report which was provided to the court, defense, and prosecution at arraignment. A sample of the report can be found in Appendix C.

Predictive Validity

The 2014 test subset is used to establish the predictive validity of the 2003 CJA Release Assessment via bivariate analysis. The analysis indicates that all individual factors were statistically significantly related to FTA (p<.001) with the strongest predictive factor being "Does prior warrant equal zero" (*Phi*=-.161), and the weakest predictive factor being "Does the defendant expect someone at arraignment" (*Phi*=-.038). An examination of the assessment score and its relationship to FTA reveals rates ranging from 39.1 (score of -12) to 4.8 (score of 12). [10, 11] The model Area Under the Curve for the Receiver Operator Characteristics (AUC-ROC), a common measure of assessment performance, is calculated (*AUC-ROC*=.670). The AUC-ROC gauges the performance of the total score in differentiating between individuals who do not experience an FTA from those who experience an FTA pending disposition. Appendix D contains the complete bivariate analysis results discussed here.

Release Recommendations

The distribution of release recommendations provided to the court (Recommended for ROR, Moderate risk for ROR, and Not recommended for ROR) is presented in Table 3 below.[12] Approximately one-third of the sample (34.8%) were recommended for ROR, whereas 18.8% were identified as moderate risk for ROR, and 46.4% were not recommended for ROR at arraignment.

Table 3. Distribution of Recommendation Type
Under the 2003 CJA Release Assessment

Recommendation type	Percent
Recommended for ROR	34.8
Moderate risk for ROR	18.8
Not recommended for ROR	46.4

[10] Scores are not calculated for the 1,421 arrest cycles with incomplete interviews or the additional 65 arrest cycles missing the necessary address information and, therefore, are removed from this analysis. Analysis is also conducted by treating missing answers as negative responses, with similar results.

[11] FTA rates are not calculated for scores with less than 50 arrest cycles due to the instability of small samples. Specifically, FTA rates for scores of -13, -11, and 11 are not calculated due to there being none or a lower number of arrest cycles with each score (i.e., 0, 0, and 8, respectively).

[12] CJA did not make a release recommendation due to missing data (2.9%) and policy exceptions (0.4%). The arrest cycles without a release recommendation are excluded from the distribution.

Recommendations by Charge Severity, Race/Ethnicity, and Sex

The Recommended for ROR rates by charge severity, race/ethnicity, and sex are contained in Table 4 below. ROR was recommended at the highest rate for most serious charges of VFO (38.5%), followed by misdemeanor (36.3%) and felony non-VFO (28.1%). When considering race/ethnicity, White individuals received a recommendation for ROR at a rate of 41.1%, followed by Hispanic individuals at a rate of 35.6%, and Black individuals at a rate of 31.7%. Notably, the difference in Recommended for ROR rates between White and Black individuals was 9.4 percentage points. When examining release recommendations by sex, female individuals received a recommendation of ROR 40.7% of the time compared to 33.6% for male individuals.

Table 4. Distribution of Recommendation for ROR
by Charge Severity, Race/Ethnicity, and Sex
Under the 2003 CJA Release Assessment

Recommended for ROR	Percent
Charge severity	
Misdemeanor	36.3
Felony non-VFO	28.1
Violent felony offense	38.5
Race/ethnicity	
Black	31.7
Hispanic	35.6
White	41.1
Sex	
Female	40.7
Male	33.6

RELEASE STATUS

An individual can be released into the community or detained pending resolution of all charges. Based on the available data, an individual's release status is grouped into one of three categories: released on ROR at arraignment, released after arraignment and before disposition (either on ROR, with nonmonetary conditions, or on bail), or not released before disposition. The distribution of release status is provided in Table 5 below. Nearly 84% of all arraigned individuals were released while their charges were pending in court. Specifically, 65.4% of all arraigned individuals were released on ROR at arraignment, while an additional 18.4% were not released on ROR at arraignment but were released prior to disposition. The remaining 16.2% of individuals were not released pending disposition.

Table 5. Distribution of Release Status

Release status	Percent
Released on ROR at arraignment	65.4
Released after arraignment and before disposition	18.4
Not released before disposition	16.2

Status by Charge Severity, Race/Ethnicity, and Sex

To establish baseline data for comparison, release status is disaggregated by charge severity, race/ethnicity, and sex. As can be seen in Table 6 below, individuals with a most serious charge of misdemeanor were released on ROR at arraignment at a rate of 77.3%, followed by felony non-VFO (45.7%), and finally, VFO (33.9%). When considering individuals released on ROR at arraignment together with those released after arraignment and before disposition, the pattern remains; the release rate was highest when the most serious charge was a misdemeanor at 89.3%, followed by 73.1% for felony non-VFO, and 72.3% for VFO.

When comparing race/ethnicity groups, White individuals were released on ROR at arraignment 70.3% of the time compared to 66.2% for Hispanic individuals, and 62.7% for Black individuals. Notably, the difference in released on ROR at arraignment between White and Black individuals was 7.6 percentage points. Furthermore, female individuals were released on ROR at a higher rate (79.9%) compared to male individuals (62.3%).

Table 6. Distribution of Release Status by Charge Severity, Race/Ethnicity, and Sex

	Released on ROR at arraignment	Released after arraignment and before disposition	Not released before disposition
Charge severity			
Misdemeanor	77.3%	12.0%	10.7%
Felony non-VFO	45.7%	27.4%	27.0%
Violent felony offense	33.9%	38.4%	27.7%
Race/ethnicity			
Black	62.7%	19.2%	18.1%
Hispanic	66.2%	18.2%	15.6%
White	70.3%	17.0%	12.7%
Sex			
Female	79.9%	10.2%	10.0%
Male	62.3%	20.2%	17.5%

Failure to Appear

The average FTA rate for individuals released prior to disposition in the 2014 test subset was 13.0%. For the purpose of establishing baseline measures, the FTA rate is calculated in relation to the release recommendation, charge severity, race/ethnicity, and sex.

As can be seen in Table 7 below, as the release recommendations became more restrictive (Recommended for ROR, Moderate risk for ROR, and Not recommended for ROR, respectively), the FTA rate increased.

Table 7. FTA Rates by Recommendation Type
Under the 2003 CJA Release Assessment

Recommendation type	FTA rate
Recommended for ROR	6.4
Moderate risk for ROR	11.1
Not recommended for ROR	20.0

As Table 8 below shows, when FTA rates are separated by charge severity, released individuals charged with a VFO had the lowest FTA rate (9.7%), followed by those charged with a felony non-VFO (12.0%), and those charged with a misdemeanor (13.7%).

Table 8. FTA Rates by Charge Severity

Charge severity	FTA rate
Misdemeanor	13.7
Felony non-VFO	12.0
Violent felony offense	9.7

Differences in FTA rates across charge severity should be considered in combination with other factors, such as the differences in rates and types of release. For example, as can be seen in Table 6 above, fewer individuals with a most serious charge of VFO were released relative to individuals with a misdemeanor most serious charge, and those with a most serious charge of VFO were less likely to be released on ROR.

FTA rates also vary by race/ethnicity and sex. As can be seen in Table 9, FTA rates vary amongst Black, Hispanic, and White individuals, as well as between female and male individuals.

Table 9. FTA Rates by Race/Ethnicity, and Sex

Failure to appear rates	Percent
Race/ethnicity	
Black	14.5
Hispanic	12.6
White	9.9
Sex	
Female	12.6
Male	13.0

UPDATED CJA RELEASE ASSESSMENT: IDENTIFYING CANDIDATE RISK FACTORS

As discussed in the Sample for Analysis section above, the research teams worked together to create an analysis file, partition it into five subsets (train, test, imputation, validation, and 2015), and create/identify key measures (e.g., release status, FTA outcome, charge severity). It was at this point in the process that the research teams separated to independently construct and test candidate risk factors using the train subset and to subsequently identify the strongest predictors of FTA. As expected, each team approached the task using methodologies from their respective disciplines (i.e., data science and more traditional social science). Although these approaches generated some differences in their output, there were many similarities in the processes, measures created and tested, and the identification of the strongest candidate risk factors. All candidate risk factors identified through the research are consistent with the factors that the bail law permits judges to consider when making release determinations.

CONSTRUCTING CANDIDATE RISK FACTORS: CRIMINAL HISTORY

Numerous candidate risk factors are constructed within each of three criminal history related domains: prior convictions, prior bench warrants, and pending case(s). Four primary approaches are used to construct criminal history measures including analyzing events (i.e., conviction, bench warrant, pending case) at varying levels of granularity, count of events, time-windows, and recency of occurrences. A brief explanation of each approach with additional examples is provided below.

Levels of Granularity

Domains are examined with varying levels of granularity. Prior convictions and pending cases, for example, are first disaggregated by charge severity (VFO, felony non-VFO, misdemeanor). Charges are also divided by class (e.g., A misdemeanor, D felony), by statute title (e.g., Title J - Offenses Involving Theft), and by code section (e.g., Section 155.30 - Grand Larceny). Prior bench warrants are categorized as pre-arraignment, pretrial, and post-disposition.[13]

Count of Events

Each candidate factor constructed at various levels of granularity is then examined as an indicator variable which measures the presence or absence of the event (e.g., has prior conviction) and as a count variable that measures the total number of events (e.g., 1, 2, 3, 4). The total count of events is also placed in various logical categories (e.g., none, 1 or 2, 3 or 4, 5 or more) for testing.

[13] *Pre-arraignment* represents a bench warrant issued before the date of arraignment. *Pretrial* represents a bench warrant issued for failure to appear after arraignment but before disposition. *Post-disposition* represents a bench warrant issued for failure to appear or for failure to comply with a diversion or sentencing related court order (such as a fine or community service) that occurs after disposition.

Time-windows

Candidate factors constructed at varying levels of granularity and counts are additionally examined by use of a time-window strategy. A time-window is established by setting a number of years prior to the date of the arraignment for the arrest cycle under examination. For example, setting a time-window of 5 years for the misdemeanor conviction measure means that misdemeanor convictions that occurred within 5 years prior to the arraignment date are counted, and misdemeanor convictions that occurred longer than 5 years prior to the arraignment are not counted. Time-windows are set in yearly increments (1 year, 2 years, 3 years, 4 years) which are used in cumulative (e.g., number in the past 1 year, number in the past 2 years, number in the past 3 years) and non-cumulative (number in the past 1 year, number in the past 1 to 3 years, number in the past 3 to 5 years) approaches. The use of time-windows allows for testing the role of event type, frequency, and time simultaneously.

Recency

The recency of each event is explored. For example, when considering an individual with prior bench warrants, the recency of the bench warrant is measured as the time since the last bench warrant (e.g., within the past year, 1 to 2 years, 2 to 4 years). The recency of each event type serves as an additional measure of time and is often referred to as 'time since' (e.g., time since last bench warrant, time since last conviction).

Constructing Candidate Risk Factors: Community Ties

The majority of the self-reported information contained in the CJA interview data relates to address, employment, school/training program, with whom the person lives, and the presence of a telephone in his or her residence or a cellphone. These measures are broken down at varying levels of granularity (e.g., location of address, relationship to the person they live with) and through the use of time measures (e.g., length at current address, length of current employment, length at last two addresses).

Testing Candidate Risk Factors

The process of constructing candidate risk factors described above results in approximately 2,000 factors, all representing ways of measuring prior convictions, prior bench warrants, pending case(s), and community ties. Testing of candidate risk factors involves conducting bivariate analysis to explore whether a relationship exists between a factor and the FTA outcome (Chi-square $p<.01$), and the strength of the association (e.g., Phi or Cramer's V). The factors with the strongest relationship with FTA are then used to build multivariate models to assess the predictive value when grouped with other factors. A combination of bivariate analysis and statistical model building led each research team to narrow the candidate risk factors to 8 to 10 of the strongest predictors.

Reconciling Candidate Risk Factors

Following several months of independent candidate risk factor construction and testing, each research team shared their findings with the Research Partnership. Two overarching patterns emerged. Specifically, the number of criminal history events as well as the recency of those events are more strongly related to FTA. In addition, six themes related to the strongest predictors of FTA were identified including:

1. Prior bench warrants, including the count, time-window, and recency of the last bench warrant;
2. Prior misdemeanor convictions, including count, time-window, and recency of the last misdemeanor conviction;
3. Prior felony convictions, including count, time-window, and recency of the last felony conviction;
4. Pending misdemeanor or felony charge at the time of the arrest;
5. Length living at address; and
6. Telephone in his or her residence or a cellphone.

The findings from the two independent research teams were combined, and the teams worked together to refine candidate risk factors. Next, the results were shared with the RAC who provided insights into the findings and suggestions for additional analysis, as well as guidance for using the candidate risk factors to build and test statistical models.

UPDATED CJA RELEASE ASSESSMENT: MODEL BUILDING AND TESTING

The success and utility of the updated CJA Release Assessment hinges on two critical features: its accuracy and transparency. The importance of providing accurate predictions to judges and court actors about the likelihood of appearance in court cannot be overstated. Predictions are used to inform the discussion of pretrial release by court actors at arraignment, assist judges when making the pretrial release decision, and potentially affect pretrial outcomes. In addition to the importance of accuracy in predictions, transparency is similarly important – as evidenced by its inclusion in the three guiding principles of updating the assessment.

After consultation with the RAC and receiving input through stakeholder engagement, transparency was operationalized in at least five ways as it relates to model building:

1. Assessment factors, weighting, and scoring method must be known;
2. Judges, court actors, advocates, and affected communities and individuals must be able to understand how the assessment functions;
3. An individual's factor responses must be provided along with the supporting documentation that led to the response values;
4. Individual results must be open to inspection and be able to be challenged; and
5. Factors and scores must be able to be corrected during the arraignment.

BUILDING THE STATISTICAL MODEL

The commitment to achieving both accuracy and transparency led to the decision to build the statistical model using logistic regression[14] in lieu of more opaque machine learning techniques (e.g., a random forest algorithm which is often referred to as a 'black box'). While the research teams worked independently to identify candidate risk factors, they built the statistical model together. Using the train subset, one research team (CLNY) led the model building process while the other research team (Luminosity) independently confirmed the results.

Model Factors

After an extensive testing and reconciliation process, eight factors were selected for inclusion in the model.

1. Years since last bench warrant (within the last five years)
2. Two or more bench warrants in the last five years
3. Number of misdemeanor or felony convictions in the last year
4. Number of misdemeanor convictions in the last three years

[14] CLNY used a technique known as regularized logistic regression while Luminosity used a standard logistic regression. The two techniques yielded nearly identical results, but the ultimate model was created using an L2-regularized logistic regression.

5. Number of felony convictions in the last ten years
6. Number of pending cases
7. Number of years living at last two addresses
8. Reachable by phone

Converting Count Factors into Categories

Several of the factors are count variables (e.g., the number of bench warrants in the last five years). In predictive modeling, it is often best practice to convert count variables into categorical variables (e.g., 0, 1, and 2+) when the count factor exhibits diminishing marginal returns with the outcome. For example, as can be seen in Table 10, the increase in FTA rates is substantially higher between 0 to 1 bench warrants in the past five years than it is between 1 to 2 bench warrants in the past five years. The increase in the FTA rate from 0 prior bench warrants to 1 prior bench warrant is about 12 percentage points (from 11.3% to 23.2%), while the increase from 1 prior bench warrant to 2 prior bench warrants is about 4.5 percentage points. The smaller marginal difference suggests a non-linear relationship between the number of bench warrants in the past five years and FTA. Linear models, like logistic regression, are able to model this relationship better when using a categorical representation of the factor rather than a count variable.

Table 10. Failure to Appear Rate for Released Individuals by Number of Bench Warrants

Number of bench warrants in last 5 years	FTA rate
0	11.3
1	23.2
2	27.6

The exact categories are derived for each of the affected factors by testing which category definition yielded the most predictive model. The constraint of each factor category representing at least 5% of the sample was imposed in order to maintain a lower number of meaningful categories per factor. The categories or 'bins' that were adopted are shown in Table 11 below.

Table 11. Selected Factors and Categories for Updated CJA Release Assessment

Factor	Categories
Years since last bench warrant	▪ Less than 1 year ▪ 1-2 years ▪ 2-5 years ▪ No bench warrant in last five years
Two or more bench warrants in the last five years	▪ Yes ▪ No
Number of misdemeanor or felony convictions in the last year	▪ 1 or more ▪ None
Number of misdemeanor convictions in the last three years	▪ 3 or more ▪ 2 ▪ 1 ▪ None
Number of felony convictions in the last ten years	▪ 1 or more ▪ None
Number of pending cases	▪ 1 or more ▪ None
Years living at last two addresses	▪ No reported address ▪ Less than three years ▪ Three or more years
Reachable by phone	▪ No ▪ Yes

Assigning Weights (Point Values)

The final point values for the updated CJA Release Assessment factors derive from the logistic regression coefficient for each factor.[15] Table 12 below shows the results of the logistic regression, the rounding procedure, and the final point values. The columns represent the following:

- First column shows each factor, broken down by each potential answer;
- Second column shows the coefficient from the logistic regression;
- Third column shows initial points, the value of the coefficient being scaled and rounded; and
- Fourth column shows the final points after converting all point values to have the same sign.

In the third "initial points" column, the values are mostly positive, which indicates that there is a positive relationship between an affirmative answer for most factors (e.g., prior bench warrants) and the likelihood of failure to appear. The exception is 'Years living at last two addresses = 3 or more years', where an affirmative answer decreases the likelihood of failure to appear, which results in a negative initial point value. Stakeholder engagement suggested that it would be easier to re-score

[15] A variant of the select-regress-and-round procedure was used. This procedure involves fitting a linear model, and then rescaling and rounding the coefficients from the model to yield integer-valued weights. See Jung, J., Concannon, C., Shroff, R., Goel, S., & Goldstein, D. G. (2017). Simple rules for complex decisions. *Available at SSRN 2919024*.

the assessment if all factors had the same sign, so that computing the score would only involve subtraction instead of addition and subtraction. As a result, the initial integer points are converted to a final point value such that all points have the same sign (positive).

Table 12. Updated CJA Release Assessment Factor, Coefficient, Initial and Final Points

Factor	Coefficient	Initial points	Final points
Years since last bench warrant = 2-5 years	0.395	3	3
Years since last bench warrant = 1-2 years	0.544	4	4
Years since last bench warrant = Within past year	0.738	6	6
2 or more bench warrants in the last five years = Yes	0.179	2	2
Misdemeanor or felony conviction in last year = Yes	0.213	2	2
Misdemeanor conviction last 3 years = 1	0.097	1	1
Misdemeanor conviction last 3 years = 2	0.194	2	2
Misdemeanor conviction last 3 years = 3+	0.291	3	3
Felonies in last 10 years = 1+	0.128	1	1
Pending cases = 1+	0.308	3	3
Years living at last two addresses = 3 or more years	-0.146	-1	0
Years living at last two addresses = Less than 3 years	0.181	1	2
Years living at last two addresses = No address	0.477	4	5
Reachable by phone = No	0.455	3	3

Total Score

The updated CJA Release Assessment consists of a 26-point scale (scores ranging from 0 to 25). In lieu of providing the corresponding rates that reflect the likelihood of failing to appear, the decision was made to cast the assessment in more positive terms by providing the likelihood of appearing for all required court hearings (i.e., the inverse of FTA). To achieve this, each person begins with a score of 25 and points are subtracted when a factor is present. The result of this scoring strategy is that higher scores are associated with a greater likelihood of appearing for all required court hearings, while lower scores are associated with a lower likelihood of appearing for all required court hearings.

PREDICTIVE VALIDITY

While the train subset is used to build the statistical model, the 2014 test subset is used to establish the predictive validity of the updated CJA Release Assessment via bivariate analysis. The analysis reveals that all individual factors are statistically significantly related to FTA (p<.001) with the strongest predictive factor being "Years since last bench warrant" (*Phi*=.195), and the weakest predictive factor being "Number of felony convictions in last 10 years" (*Phi*=.051). An examination of the total score and its relationship to FTA reveals rates ranging from 47.3 (score of 3) to 6.6 (score of 25).[16,17] Conversely, the appearance rates range from 52.7 to 93.4. The model Area Under the Curve for the Receiver Operator Characteristics (AUC-ROC), a common measure of assessment performance, is calculated (*AUC-ROC*=.677). The AUC-ROC gauges the performance of the total score in differentiating between individuals who do not experience an FTA from those who experience an FTA pending disposition. Appendix E contains the complete bivariate analysis results discussed here.

[16] Scores are not calculated for the 1,421 arrest cycles with incomplete interviews or the additional 65 arrest cycles missing the necessary address information and, therefore, are removed from this analysis. Analysis is also conducted by treating missing answers as negative responses, with similar results.

[17] FTA rates are not calculated for scores with less than 50 arrest cycles due to the instability of small samples. Specifically, FTA rates for scores of 0, 1, and 2 are not calculated due to the lower number of arrest cycles with each score (i.e., 11, 35, and 12, respectively).

UPDATED CJA RELEASE ASSESSMENT: ESTIMATING APPEARANCE RATES

In addition to generating a score between 0 and 25, the updated CJA Release Assessment introduces a new feature – the estimated appearance rate associated with a given score, which communicates the likelihood of individuals with that score appearing for all required court hearings. This feature is introduced with the goal of communicating more detailed and useful information to judges and court actors. The scores convey relative success rates (individuals with higher scores are estimated to appear at higher rates relative to individuals with lower scores), but they fail to communicate the magnitude of the differences. By including estimated appearance rates associated with the specific scores, the updated CJA Release Assessment moves beyond an abstract indication of more or less likely to appear at court hearings to a quantified understanding of likelihood of appearance.

Computing appearance rates involves calculating the percentage of arrest cycles without an FTA among the set of individuals with that score who continued beyond arraignment in 2014.[18] Importantly, the average appearance rates are calculated for all continued arrest cycles, not just for the arrest cycles that were released pending disposition. Computing appearance rates using only individuals who are released pretrial would result in under-estimating FTA rates because individuals with higher risk for FTA are less likely to be released. This phenomenon is corrected by calculating the appearance rates among all continued arrest cycles. For individuals who were not released pretrial, a statistical technique known as imputation is used to estimate what the FTA outcome would have been.[19] The estimated appearance rates are computed by averaging the FTA outcomes for all individuals, using the observed FTA outcomes for individuals who were released and using the imputed FTA outcomes for individuals who were not released.

The scores, number and percent of arrest cycles receiving each score, and the estimated appearance rates computed as described above are found in Table 13. An examination of the estimated appearance rates reveals that similar scores have similar appearance rates (e.g., scores of 19 and 20 with appearance rates of 81.6% and 82.9%, respectively). In addition, some scores consist of a relatively small number of arrest cycles, particularly as scores decline. In order to increase precision and reduce the visual complexity of showing appearance rates, the scores are grouped into 10 score ranges, which are also contained in the table below.

[18] The test and validation subsets are merged (together reflecting 100% of the 2014 data) in order to obtain more precise estimates of appearance rates, particularly for scores with a small number of arrest cycles. In addition, the merged dataset implements marihuana expungement, as discussed on page 7, in order to best reflect the data source that the updated CJA Release Assessment will be operationalized on. Last, scores and appearance rates were calculated for any row for which a score could be calculated under the updated Release Assessment (rows with phone and address information).

[19] Imputation involves estimating a statistical model to predict FTA based on all observable information in the dataset. The imputation model was built on the imputation subset, which includes half of continued arrest cycles from 2009-2013.

Table 13. Updated CJA Release Assessment Score, Range, and Appearance Rate

Score	Total N	Total percent	Appearance rate	Score range	Appearance rate
25	50,640	36.7	93.0	25	93.0
24	5,527	4.0	88.3	23-24	89.1
23	8,741	6.3	89.7		
22	22,370	16.2	87.4	21-22	86.8
21	4,878	3.5	84.3		
20	6,682	4.8	82.9	19-20	82.3
19	6,215	4.5	81.6		
18	3,079	2.2	79.7	16-18	76.3
17	4,310	3.1	76.0		
16	5,095	3.7	74.6		
15	2,117	1.5	74.5	12-15	71.0
14	4,176	3.0	71.4		
13	2,619	1.9	70.5		
12	2,102	1.5	67.1		
11	2,426	1.8	65.0	9-11	63.0
10	1,205	0.9	65.3		
9	1,818	1.3	58.8		
8	1,344	1.0	57.9	7-8	56.8
7	549	0.4	54.1		
6	874	0.6	51.9	4-6	49.9
5	390	0.3	50.1		
4	358	0.3	44.6		
3	276	0.2	44.3	0-3	41.7
2	49	0.0	35.8		
1	165	0.1	39.4		
0	90	0.1	41.1		

UPDATED CJA RELEASE ASSESSMENT: GENERATING RELEASE RECOMMENDATIONS

CJA's Release Assessments have included a recommendation regarding release on recognizance, dating back to the 1960s. The decision to continue this practice in the updated CJA Release Assessment was made after extensive consultation with judges and court actors.[20] Given that the updated CJA Release Assessment has a new scoring model, it was also necessary to revise the recommendation framework. The goals of updating the assessment guided the process of designing a recommendation framework. To reiterate, the goals were to: (1) maintain the current high court appearance rates for people released pretrial, (2) reduce the use of pretrial detention when possible, and (3) reduce racial and other disparities in pretrial settings. Input received through consultation with the RAC, judges, court actors, advocates, and affected communities and individuals, also played a substantial role during the recommendation framework revision process. Although recommendation frameworks by their very nature require policy evaluations – which is true for all release or risk assessments not just those in the pretrial setting – it is critical that they be research-informed. To balance the goals of maintaining the current high court appearance rates for people released pretrial and reducing pretrial detention when possible, a strategy called failure to appear matching (a.k.a. FTA matching) was employed as described below.

FTA Matching Strategy

The goals of maintaining the current high court appearance rates while simultaneously reducing pretrial detention when possible and reducing disparities in pretrial settings are operationalized by adopting the following strategy: recommend ROR for as many individuals as possible, subject to the constraint that the projected number of FTAs does not increase. Specifically, the projected number of FTAs among those recommended for release under the updated CJA Release Assessment should approximately match the observed number of FTAs based on recent pretrial practices during the tenure of the 2003 CJA Release Assessment. The FTA matching strategy essentially sets the threshold for recommending ROR (reducing pretrial detention) at the point where the projected number of FTAs is approximately equal to the number of observed FTAs (maintaining New York City's high court appearance rates).

This process begins by counting the observed number of FTAs in the 2014 test subset, (which is a random sample of 50% of continued arrest cycles from 2014, N = 70,597).[21] The number of observed FTAs disaggregated by the most serious charge at arraignment is shown in Table 14.

[20] The Research Partnership considered only showing the scores and corresponding appearance rates without including a release recommendation on the updated CJA Release Assessment report. However, stakeholders largely concurred that the inclusion of an explicit recommendation is helpful.

[21] Marihuana expungement is applied to the test subset in this section (Updated CJA Release Assessment: Release Recommendations) in order to best estimate the distribution of updated CJA Release Assessment recommendations that will be seen in practice.

Table 14. Observed FTA by Charge Severity

Charge severity	FTA count
Misdemeanor	5,648
Felony non-VFO	1,274
Violent felony offense	588
Total	7,510

Initially, setting a single threshold for ROR was considered (no differentiation by the most serious charge at arraignment). That strategy would simply require that the projected number of FTAs approximately matches the 7,510 FTAs observed in the test subset. It was identified early on that this thresholding strategy would significantly change the composition of FTAs. Specifically, the projected number of FTAs would be lower for those charged with a misdemeanor (a decrease of 6%); substantially higher for those charged with a felony non-VFO (an increase of 22%); and greater still for those charged with a VFO (an increase of 41%). As a result, the decision was made to develop the recommendation framework using the FTA matching strategy for each charge severity. This decision is supported by the bail law, which permits judicial consideration of the charges presently filed against a defendant.[22]

ROR Recommendation Thresholds

The process of selecting the threshold or 'cutoff' for Recommended for ROR for each charge severity (i.e., misdemeanor, felony non-VFO, VFO) is performed by identifying the projected number of FTAs related to each score, then selecting the score that most closely approximates the observed number of FTAs for that charge severity.[23] For example, if the Recommended for ROR threshold is set at a score of 24 for misdemeanor arrest cycles, meaning that any misdemeanor arrest cycle with a score of 24 or above would be recommended for ROR, it is projected there would be 1,437 arrest cycles resulting in an FTA in the Recommended for ROR group. This is significantly less than the 5,648 observed in the test subset. On the other hand, if the Recommended for ROR threshold is set at a score of 5, it is projected there would be 7,001 arrest cycles with an FTA, which is more than observed. Setting the misdemeanor threshold at a score of 12 yields 5,836 FTAs, which closely matches the observed number. This selection process is performed for each charge severity, resulting in

[22] Until January 1, 2020, Criminal Procedure Law § 510.30 permitted judges to consider various aspects of the present charges against an individual when making release determinations. Effective January 1, 2020, § 510.30, as amended by changes to the statute enacted in 2019, the bail law expressly permits judges to consider "the charges facing the principle" when making such determinations. The amended law also takes charge severity into account in other ways, including by preserving bail as an option for most violent felony offenses and under other specified circumstances. Further amendments enacted in 2020 taking effect July 2020 make additional offenses bail eligible.

[23] One constraint imposed is that the number of projected FTAs could not exceed the observed number of FTAs for VFOs.

recommendations for ROR score thresholds of 12 for misdemeanor, 16 for felony non-VFO, and 19 for VFO. This approach sets ROR recommendation thresholds that are projected to yield approximately the same number of failures to appear for each of the three charge severities as those observed under recent pretrial practice and the tenure of the 2003 CJA Release Assessment.

Three-Category Recommendation System

One final consideration related to the ROR recommendation score thresholds is whether the remaining scores, those below the threshold, would be considered as simply not recommended for ROR or would receive a different recommendation. As discussed on page 9 above, the 2003 CJA Release Assessment contained three recommendation types: Recommended for ROR, Moderate risk for ROR, and Not recommended for ROR. Whether to maintain the existing three-category system of release recommendations or change to a two-category system is primarily driven by the guiding goals and principles of the update process. Input from judges and court actors, as well as the RAC and other stakeholders, was solicited. This resulted in maintaining, but updating, a three-category system of release recommendations: Recommended for ROR, Consider all options, and Not recommended for ROR.

Recommendation Framework

The result of the FTA matching strategy based on charge severity, combined with the decision to utilize a three-category release recommendation system, is shown in Table 15. As can be seen below, the threshold for Not recommended for ROR is the same for all charge severities, while the Recommended for ROR and Consider all options thresholds vary.

Table 15. Recommendations Based on Score and Charge Severity

Charge severity	Scores 0-11	Scores 12-15	Scores 16-18	Scores 19-25
Misdemeanor	Not rec. for ROR	Rec. for ROR	Rec. for ROR	Rec. for ROR
Felony non-VFO	Not rec. for ROR	Consider all options	Rec. for ROR	Rec. for ROR
Violent felony offense	Not rec. for ROR	Consider all options	Consider all options	Rec. for ROR

Release Recommendations

The distribution of projected release recommendations (Recommended for ROR, Consider all options, Not recommended for ROR), based on continued arrest cycles from the 2014 test subset, is presented in Table 16. For the purposes of best estimating the performance of the operationalized updated CJA Release Assessment, these projections show how the assessment would perform with marihuana expungement in effect (marijuana expungement affects the recommendation in less than 1% of arrest cycles).

For individuals with the most serious charge of misdemeanor, 93.6% would be recommended for ROR, 0% would be recommended for consider all options, and 6.4% would not be recommended for ROR. For individuals with the most serious charge of felony non-VFO, 81.4% would be recommended for ROR, 9.7% would be recommended for consider all options, and 8.9% would not be recommended for ROR. For individuals with the most serious charge of VFO, 76.4% would be recommended for ROR, 17.8% would be recommended for consider all options, and 5.8% would not be recommended for ROR.

Table 16. Recommendation by Charge Severity

Charge severity	Recommended for ROR	Consider all options	Not recommended for ROR
All	89.0%	4.1%	6.8%
Misdemeanor	93.6%	0.0%	6.4%
Felony non-VFO	81.4%	9.7%	8.9%
Violent felony offense	76.4%	17.8%	5.8%

Across all severities, it is projected that 89.0% of all individuals would be recommended for ROR. Because the recommendation thresholds were chosen using the FTA matching strategy, these recommendation rates would not result in an increase in the projected number of failures to appear, under the updated CJA Release Assessment.

UPDATED CJA RELEASE ASSESSMENT: COMPARING PERFORMANCE TO THE 2003 ASSESSMENT

The process of updating the CJA Release Assessment was undertaken to achieve the overarching goals of (1) maintaining the current high court appearance rates in New York City for people released pretrial, (2) reducing the use of pretrial detention when possible, and (3) reducing racial and other disparities in pretrial settings. This section compares and contrasts the performance of the 2003 and updated CJA Release Assessments, with an emphasis on how the updated assessment achieves the three overarching goals.

The 2003 and updated CJA Release Assessments have several similarities. Both consist of less than 10 research-based factors, which are weighted based on the strength of the relationship between each factor and FTA. The weights (point scores) are totaled to calculate a single score on a 26-point scale (i.e., -13 to 12, 0 to 25). The score, combined with other decisions, is used to provide a release recommendation. There are also some meaningful differences between the two assessments, including the factors that are considered, the weightings that are applied, the inclusion of appearance rates in the updated CJA Release Assessment, and the components of the recommendation framework. The details of each assessment's development, how it was operationalized, the recommendation framework, and overall performance are contained in earlier sections of this report. In this section, the 2014 test subset[24] is used to compare the performance of the updated CJA Release Assessment in relation to the 2003 CJA Release Assessment in terms of predictive validity, release recommendations, and false positive rates.

As the analysis below demonstrates, the updated CJA Release Assessment has greater predictive validity at the risk factor, score, and statistical model levels. It also recommends a far greater number of people for ROR while maintaining the current high court appearance rates, substantially reduces the disparity in recommendation rates when considering race/ethnicity and sex, and dramatically reduces the magnitude of false positive rates and the differences in false positive rates based on race/ethnicity and sex. The updated CJA Release Assessment outperforms the 2003 assessment when considering predictive validity, release recommendations, and false positive rates, and is forecast to advance all of the overarching goals of the updated CJA Release Assessment.

PREDICTIVE VALIDITY

The factors, as well as the strength of their relationship with FTA, differ between assessments. The analysis presented in earlier sections reveals that constructing factors using varying levels of granularity, count of events, time-windows, and measures of recency, identified factors with stronger relationships to FTA. In the 2003 CJA Release Assessment, for example, the factor with the strongest relationship to FTA (*Phi* = -.161) is a single factor "Does prior warrant equal zero" used to measure

[24] In this section, the marihuana expungement logic is not applied for the purposes of comparing the performance of the 2003 and updated CJA Release Assessments. In addition, when showing projections for release recommendation rates, the analysis excludes arrest cycles where a recommendation was not made.

prior bench warrants. This factor represents whether the person's criminal history contains a prior bench warrant, with no consideration to the number of bench warrants or the recency of the bench warrants. Alternatively, the updated CJA Release Assessment uses two separate factors – "Years since last bench warrant" (Less than 1 year, 1-2 years, 2-5 years, No bench warrant in last five years) and "Two or more bench warrants in last five years" (Yes, No). These two updated prior bench warrant factors add to the strength of the assessment with *Phi* values of .195 and .154, respectively. Seven of the eight updated factors have *Phi* values equal to or greater than .100, compared to three of the six factors in the 2003 CJA Release Assessment.

When considering the 26-point scale, the 2003 CJA Release Assessment FTA rates for released individuals vary from 4.8 to 39.1, while the updated CJA Release Assessment FTA rates vary from 6.6 to 47.3. The updated assessment has a larger amount of dispersion (difference between the lowest and highest scores), 40.7 vs. 34.3, respectively. The greater dispersion means that a one-point decrease on the updated CJA Release Assessment's scale communicates more information about the likelihood of FTA than it did on the 2003 CJA Release Assessment. In addition, the model AUC-ROC[25] is higher for the updated assessment, .677 vs. .670, respectively.

Furthermore, there is a greater difference in FTA rates based on the release recommendations. For the 2003 CJA Release Assessment, the FTA rates by recommendation categories are 6.4% (Recommended for ROR), 11.1% (Moderate Risk), and 20.0% (Not Recommended for ROR). Using the updated CJA Release Assessment, the FTA rates by recommendation categories are 11.7% (Recommended for ROR), 18.5% (Consider all options), and 34.8% (Not Recommended for ROR). The greater differences in FTA rates between recommendation categories means that the recommendations on the updated CJA Release Assessment communicate more information about the likelihood of FTA.

Release Recommendations

Recall that two of the overarching goals of updating the assessment are to maintain the current high court appearance rates in New York City for people released pretrial while simultaneously reducing the use of pretrial detention when possible. Determining the extent to which the updated assessment achieves these goals involves an examination of the distribution of release recommendations for both the 2003 and updated CJA Release Assessments (see Table 17 below). When using the updated CJA Release Assessment, 88.4% of all individuals are recommended for ROR, compared to 34.8% for the 2003 CJA Release Assessment. The 2003 CJA Release Assessment recommended against ROR for 46.4% of arrest cycles, compared to 7.2% for the updated CJA Release Assessment. Understanding that the recommendation thresholds were chosen specifically such that the projected number of

[25] The model Area Under the Curve for the Receiver Operator Characteristics (AUC-ROC) is a common measure of assessment performance. The AUC-ROC gauges the performance of the total score in differentiating between individuals who do not experience an FTA from those who experience an FTA pending disposition. The difference in AUC-ROC is statistically significant.

failures to appear for each charge type would remain consistent with those observed under recent pretrial practice, the increase in the rate of recommendations for ROR is accomplished without an increase in FTAs. As such, the increase in rates of recommended for release on ROR is consistent with both the goal of maintaining the current high court appearance rates in New York City for people released pretrial and the goal of reducing the use of pretrial detention when possible.

Table 17. Distribution of Recommendation Type

Recommendation type	2003 assessment	Updated assessment
Recommended for ROR	34.8%	88.4%
Moderate risk for ROR (2003)	18.8%	-----
Consider all options (updated)	-----	4.3%
Not recommended for ROR	46.4%	7.2%

Recommendations by Race/Ethnicity and Sex

The third overarching goal of updating the assessment is to reduce racial and other disparities in pretrial settings. Pursuant to this goal, the absolute rates and relative differences in ROR recommendations across race/ethnicity and sex are adopted as metrics of fairness. An additional metric of fairness – false positive rates – is discussed in the subsection below.[26]

As can be seen in Table 18, the updated CJA Release Assessment is estimated to increase the rate of ROR recommendations by approximately 50 percentage points for all race/ethnicity groups and for both sexes. In addition to recommending release on recognizance for significantly greater proportions of all race/ethnicity and sex groups, the updated Release Assessment also reduces the disparities in the rates of recommendation for ROR. The difference in the rates of recommendation for ROR across all race/ethnicities is cut in half (from 9.4 percentage points under the 2003 CJA Release Assessment to 4.3 percentage points in the updated version), as is the difference between sexes (from 7.1 percentage points to 3.4 percentage points).

[26] As recent research has demonstrated, it is difficult and sometimes impossible to simultaneously satisfy all notions of algorithmic fairness, particularly when the base rates (average failure rates) vary across groups, as is the case here (see Kleinberg, J., Mullainathan, S., & Raghavan, M. (2016). Inherent trade-offs in the fair determination of risk scores https://arxiv.org/pdf/1609.05807.pdf). To that end and consistent with the goal of reducing racial and other disparities in pretrial settings, the Research Partnership strove to minimize disparities whenever possible throughout development of the updated CJA Release Assessment.

Table 18. Distribution of Recommendation for ROR by Race/Ethnicity and Sex

Recommended for ROR	2003 assessment	Updated assessment
Race/ethnicity		
Black	31.7%	86.6%
Hispanic	35.6%	89.6%
White	41.1%	90.9%
Sex		
Female	40.7%	91.2%
Male	33.6%	87.8%

In addition, examining the number of individuals represented by the above percentages may be helpful in conveying the magnitude of this shift. For example, projections show that using the updated CJA Release Assessment would result in an increase in ROR recommendations – relative to the prior assessment – for an additional 41,700 Black individuals, 19,800 Hispanic individuals, and 8,000 White individuals over the course of the year.[27]

Given both the increase in overall rates of recommendation for all individuals, as well as the reduction in disparities across race/ethnicity and sex, the performance of the updated CJA Release Assessment is consistent with the overarching goal of reducing racial and other disparities in pretrial settings.

False Positive Rates

False positive rates are another metric used to assess the degree to which the updated CJA Release Assessment achieves the overarching goal of reducing racial and other disparities in pretrial settings. False positive rates measure the fraction of people who – despite the fact that they appeared for all of their court hearings – had low scores (representing higher risk of FTA) and were not recommended for ROR. Table 19 contains the false positive rates by race/ethnicity and by sex. As can be seen below, false positive rates are estimated to decrease substantially under the updated CJA Release Assessment. The overall false positive rate for the 2003 Release Assessment is 36.9%, compared to 3.1% for the updated Release Assessment. The expected result when using the updated CJA Release Assessment in the future is that far fewer people who would actually attend all required court appearances would receive low scores on the assessment (representing higher risk of FTA) and thus not be recommended for ROR.

[27] While all other results presented in this section are calculated using the 2014 test subset, the numbers related to the additional individuals recommended for ROR in the course of a year are calculated using the test and validation subsets, which represents *all* arrest cycles that occurred in 2014.

In addition to the updated CJA Release Assessment reducing the overall false positive rate, it also considerably reduces the differences in false positive rates between groups. While the disparity in false positive rates with the 2003 CJA Release Assessment for race/ethnicity was 15.4 percentage points (42.0 vs. 26.6), it is projected to be 0.9 percentage points (3.6 vs. 2.7) for the updated assessment. Similarly, when considering sex, the difference in false positive rates shrink from 13.3 percentage points (39.5 vs. 26.2) to 1.1 percentage points (3.3 vs. 2.2) in the updated assessment. The considerable reduction in disparity in false positive rates is consistent with the overarching goal of reducing racial and other disparities in pretrial settings.

Table 19: Updated CJA Release Assessment False Positive Rate by Race/Ethnicity and Sex

False positive rate	2003 assessment	Updated assessment
All individuals	36.9	3.1
Race/ethnicity		
Black	42.0	3.6
Hispanic	36.6	3.0
White	26.6	2.7
Sex		
Female	26.2	2.2
Male	39.5	3.3

Comparison Summary

The process of updating the CJA Release Assessment was undertaken to achieve the overarching goals of (1) maintaining the current high court appearance rates in New York City for people released pretrial, (2) reducing the use of pretrial detention when possible, and (3) reducing racial and other disparities in pretrial settings. The above analysis examined the performance of the updated CJA Release Assessment in relation to the 2003 assessment, with an emphasis on how the updated assessment achieves the three overarching goals. The updated CJA Release Assessment demonstrates greater predictive validity at the risk factor, score, and statistical model levels. The 26-point scale has a larger amount of dispersion (difference between the lowest and highest scores) as does the recommendation framework (greater difference in FTA rates based on the release recommendations). These attributes mean that the updated CJA Release Assessment is able to communicate more information about the likelihood of FTA.

When considering the absolute rates and relative differences in ROR recommendations across race/ethnicity and sex, as well as the false positive rates (an adopted metric of fairness), the updated CJA Release Assessment outperforms the 2003 assessment on every metric. The updated CJA Release

Assessment recommends substantially more individuals (an increase of 50 percentage points and tens of thousands of people) for ROR while maintaining the current high court appearance rates. It is projected to cut in half the disparity in recommendation rates when considering race/ethnicity and sex, and to reduce by more than 10-fold the false positive rates and the differences in false positive rates based on race/ethnicity and sex. In short, the updated CJA Release Assessment outperforms the 2003 assessment when considering predictive validity and all metrics of fairness, and it is forecast to significantly advance all of the overarching goals of the updated CJA Release Assessment.

UPDATED CJA RELEASE ASSESSMENT: CALIBRATION OF APPEARANCE RATES

One of three overarching goals of updating the assessment is to reduce racial and other disparities in pretrial settings. In the previous section, three metrics of fairness are examined, including the absolute rates and relative differences in ROR recommendations, as well as false positive rates. As discussed above, when considering these three metrics of fairness, the updated CJA Release Assessment substantially outperforms the 2003 assessment on every metric. In this section the fourth and final metric of fairness is examined – calibration by race/ethnicity and sex.

Recall that the updated CJA Release Assessment introduces the new feature of displaying projected appearance rates for each score range. This new feature lends itself to the fairness metric of calibration by race/ethnicity and sex, which tests whether the displayed appearance rates are equally informative for all groups.[28] Specifically, calibration across race/ethnicity or sex requires that, within each score range, the appearance rates of different groups are similar. The Research Partnership chose to operationalize calibration in more concrete terms by testing the following criterion: is the average appearance rate for individuals of a particular race/ethnicity or sex closer to the average appearance rate for all individuals in that score range or the average appearance rate for a different score range?

Recent scholarship has shown that ensuring exact calibration across groups is difficult in algorithms and assessments that either use a small number of factors or communicate risk using a limited number of categories.[29] Given that the updated CJA Release Assessment was guided by the principle of transparency and the many ways that it was operationalized (see Updated CJA Release Assessment: Model Building and Testing section above), it was not expected to achieve exact parity in calibration.

In the instances when the calibration criterion was not met (i.e., the appearance rate for a given group is not closest to the average appearance rate for all individuals in that score range, but rather the average appearance rate for a different score range) then the impact of the miscalibration is examined using the standard proposed in Corbett-Davies et al. This standard states that groups with similar appearance rates should receive similar recommendations. Specifically, how any miscalibration affects the recommendation is examined by comparing the updated CJA Release Assessment's actual performance to a hypothetical benchmark that is adjusted to improve calibration. This hypothetical benchmark is constructed by adjusting scores (for score ranges where

[28] An analysis of the calibration of the 2003 CJA Release Assessment was not performed because a direct comparison cannot be conducted. The 2003 CJA Release Assessment did not group individual scores into score ranges, as the updated Release Assessment does, and it did not display the appearance rates on the associated form.

[29] See Kleinberg, J. & Mullainathan, S. (2018). Simplicity Creates Inequity: Implications for Fairness, Stereotypes, and Interpretability. *Available at arXiv: 1809.04578* and Corbett-Davies, S., & Goel, S. (2018). The Measure and Mismeasure of Fairness: A Critical Review of Fair Machine Learning. *Available at arXiv: 1808.00023*. In particular, Corbett-Davies et al. note that ensuring exact calibration is difficult, and sometimes impossible, when a risk assessment uses a limited number of categories to communicate risk, as is the case here.

calibration is weaker) so that all groups with approximately the same appearance rate have the same adjusted score. The adjusted scores are then used to compare recommendations of the actual assessment to what the recommendations would be under this hypothetical benchmark with improved calibration.[30]

As the analysis below demonstrates, the assessment overall shows strong calibration; appearance rates across race/ethnicity are very similar in all score ranges and appearance rates between sexes are also very similar in score ranges for the vast majority of individuals. Recommendations of the updated CJA Release Assessment and the hypothetical benchmark agree for over 98% of individuals, and when they disagree, the updated CJA Release Assessment makes a less restrictive recommendation compared to the benchmark.

Calibration by Race/Ethnicity

Table 20 below shows the appearance rates for each race/ethnicity group.[31] The group-specific appearance rates are very similar (within 0-3 percentage points) within each score range, indicating good calibration. There is one instance where the calibration criterion is not met for White individuals (score of 21-22). Considering the hypothetical benchmark, there is no effect on the recommendation for these individuals because people in the 23-24 range and the 21-22 score range receive the same recommendation (Recommended for ROR for all charge severities).

Table 20: Appearance Rates by Score Range for All Individuals, and by Race/Ethnicity

Score range	All individuals	Black individuals	Hispanic individuals	White individuals
25	93.0	92.1	93.2	94.6
23-24	89.1	88.3	89.2	90.1
21-22	86.8	86.2	86.7	89.0
19-20	82.3	81.4	82.7	84.1
16-18	76.3	75.5	77.0	79.0
12-15	71.0	70.0	72.3	72.8
9-11	63.0	62.3	63.3	66.5
7-8	56.8	56.7	56.5	59.7
4-6	49.9	48.9	52.9	47.2
0-3	41.7	42.7	41.0	38.8

[30] The score adjustment procedure is an application of the thresholding equity criteria discussed in Corbett-Davies et al., who argue that individuals with similar appearance rates should be treated similarly.

[31] The appearance rates are calculated in the same manner as those in the Updated CJA Release Assessment: Estimating Appearance Rates section above.

CALIBRATION BY SEX

Table 21 shows the appearance rates for each sex. Appearance rates in the top four score ranges are very similar (within 0 to 2 percentage points) for both male and female individuals. These score ranges account for the vast majority of individuals (81% of women and 75% of men fall into these top four score ranges). However, appearance rates in the lower score ranges start to diverge, with female individuals having lower average appearance rates relative to male individuals with the same scores.[32]

Table 21: Appearance Rates by Score Range for All Individuals, and by Sex

Score range	All	Male	Female
25	93.0	92.9	93.6
23-24	89.1	88.9	90.4
21-22	86.8	86.8	87.3
19-20	82.3	82.2	82.8
16-18	76.3	77.0	71.6
12-15	71.0	71.9	65.1
9-11	63.0	64.8	54.1
7-8	56.8	58.5	46.8
4-6	49.8	51.7	42.0
0-3	41.7	42.6	37.2

The appearance rates displayed on the updated CJA Release Assessment are forecast to overstate the appearance rates of female individuals in lower score ranges – from 16-18 through 0-3. In each of these score ranges, the appearance rate of female individuals is closer to the average appearance rate of the score range directly below (with the exception of 0-3, which has no score range below it).

Using the hypothetical benchmark strategy discussed above to determine the effect on recommendation, the score adjustment would affect the recommendation in two circumstances. The first is female individuals with a score between 16-18, who would have an adjusted score of 12-15. This adjustment only affects the recommendation for female individuals facing non-violent felony charges[33] and causes the recommendation to move from "Recommended for ROR" to "Consider all Options". The second circumstance is female individuals who score between 12-15, who would have

[32] The appearance rate for male individuals is always closer to the average appearance rate within each score range because male individuals represent 82% of all arraigned cases. Within each score range, the portion of arraignments that involve male individuals ranges between 78% to 88%.

[33] The recommendations for misdemeanor and violent felony charges do not change between 12-15 and 16-18.

an adjusted score of 9-11. This would result in a change in recommendation from “Recommended for ROR” or “Consider All Options” to “Not Recommended for ROR”.

Calibration Summary

The updated CJA Release Assessment introduces the new feature of displaying projected appearance rates for each score range. This new feature led the Research Partnership to adopt calibration as a metric of fairness related to appearance rates. This approach includes determining if the average appearance rate for individuals of a particular race/ethnicity is closer to the average appearance rate for all individuals in that score range. When this is not the case, the effect on the recommendation is examined using the hypothetical benchmark approach.

The assessment overall shows strong calibration; appearance rates across race/ethnicity are very similar in all score ranges and appearance rates across sex are also very similar in score ranges for the vast majority of individuals. Recommendations of the updated CJA Release Assessment and the hypothetical benchmark agree for over 98% of individuals, and when they disagree, the updated CJA Release Assessment makes a less restrictive recommendation than the benchmark. As with all metrics of fairness, including those used in this research, calibration should be monitored during implementation and modifications to the assessment or recommendation framework should be made if needed.

UPDATED CJA RELEASE ASSESSMENT: REPORT

The redesign of the CJA Release Assessment report (provided in hard copy to judges and court actors at arraignment) was informed by both behavioral science and the guiding principle of transparency. Ideas42, a member of the Research Partnership, led the effort to redesign the report, working in partnership with the RAC, judges, and court actors. At the outset of the redesign process, ideas42 conducted a diagnostic assessment – including extensive interviews with judges and court actors – to learn how people use the CJA Release Assessment. Following those interviews, ideas42 used its expertise in behavioral design to draft several options for the visual representation of the report. Refinements were incorporated into the interface as a direct result of feedback from the RAC, outreach sessions, focus groups, and user testing. In particular, the Research Partnership user-tested a beta version of the report interface in focus groups with judges; the feedback informed the final design of the updated CJA Release Assessment report (see Appendix F for a sample report).

Scoring Transparency

As discussed in the Building and Testing the Updated CJA Release Assessment section above, transparency was operationalized in five ways, with three having a direct impact on the report.

1. An individual's factor responses must be provided along with the supporting documentation that led to the response values;
2. Individual results must be open to inspection and be able to be challenged; and
3. Factors and scores must be able to be corrected during the arraignment.

The report was designed to ensure it met all of these criteria. As can be seen in Appendix F, the report displays each assessment factor, the individual's response to the factor, and the supporting documentation that led to the response (i.e., the arrest cycles or interview answers). It also displays the weight applied to each factor response, followed by the total score. Not only does the display of information ensure that the assessment results are completely transparent, it allows for the judge and court actors to inspect and challenge the results. If it is determined that an error is present, the factors and scores can be corrected during the arraignment and made available to all parties.

Appearance Rates

The updated CJA Release Assessment report also communicates more information about what a score means, in particular by introducing appearance rates. The estimated appearance rate reflects the person's likelihood of appearing for all required court hearings based on the performance of other individuals with the same score. These estimated appearance rates were introduced, in part, due to feedback provided during the initial diagnostic interviews. During the diagnostic interviews, some court actors reported a lack of understanding regarding what the assessment represented when it deemed someone as Moderate risk for ROR or when it displayed a certain numerical score. These

estimated appearance rates provide more context for understanding the updated CJA Release Assessment score.[34]

In addition, the updated CJA Release Assessment focuses on the affirmative rates of court appearance rather than on rates of failure to appear. The new report highlights individuals' likelihood of court appearance because a significant majority of people *do* appear for their future court hearings.

Recommendation

A recommendation regarding pretrial release is provided in the report based on the recommendation framework discussed above. In addition to the release recommendation, the report includes a recommendation key, which is designed to convey the recommendations for any score and charge severity. This key allows judges and court actors to understand why a particular recommendation is made for any given individual. Moreover, should any adjustment of the score be necessary, this layout allows stakeholders to determine if the recommendation should also be adjusted.

[34] When appearance rates are presented, this rate is presented as individuals who appear out of 100 people. This decision was based on behavioral science research that suggests human decision makers can more readily reason about numbers presented as frequency rates, rather than percentages. See Gigerenzer, G. (1996). The Psychology of Good Judgment: Frequency Formats and Simple Algorithms. Medical Decision Making, 16(3), 273–280. https://doi.org/10.1177/0272989X9601600312

APPENDIX A – RESEARCH PARTNERSHIP

LUMINOSITY

Luminosity, Inc. is a women-owned, small business whose mission is to advance pretrial justice in America. For nearly two decades, Luminosity has leveraged data analytics and implementation science to improve public safety, fairness, and cost effectiveness in communities across the country. The Luminosity team is led by Dr. Marie VanNostrand, an experienced practitioner, skilled researcher, and nationally recognized expert in the pretrial stage of the justice system. She has presented her work at more than 100 national and state conferences, including a White House Convening on Criminal Justice Reform, the US Attorney General's Symposium on Pretrial Justice, and the Congressional Briefing on Pretrial Justice. Under her leadership, Luminosity's Data Analytics Team conducted the largest study on the effectiveness of alternatives to pretrial incarceration and developed the nation's first statewide, data-driven, pretrial assessment. They also conducted the research credited as the catalyst for criminal justice reform in New Jersey and worked in partnership with the New Jersey Courts to implement those reforms. As part of New York City's Research Partnership, Luminosity researchers leveraged their pretrial expertise, extensive experience in conducting pretrial research, and expertise in implementation science to support the development of the updated CJA Release Assessment.

THE UNIVERSITY OF CHICAGO'S CRIME LAB NEW YORK

Crime Lab is a nonprofit, faculty-led research center of the University of Chicago, with offices in both Chicago and New York City. Crime Lab is dedicated to working closely with public sector partners, leveraging data science to solve pressing social problems. Crime Lab projects have been supported by federal government agencies such as the U.S. Department of Justice, the U.S. Department of Education, and the National Institutes of Health, as well as private foundations. Previous projects of the Crime Lab and its sister organization the Education Lab have been featured in national news outlets such as the *New York Times*, *Washington Post*, *Wall Street Journal*, NPR and PBS News Hour. Crime Lab used a team of data scientists with machine learning expertise who worked on developing the updated CJA Release Assessment and supported its implementation.

IDEAS42

Ideas42 is a nonprofit design firm that uses insights from behavioral science to create innovative solutions to complex social problems. Ideas42 aims to achieve impact at scale by applying the latest research on human behavior to policy, program, and product design. This work involves educating decision makers and leaders about the power of behavioral science and how to apply it; improving existing products, policies, and programs; and inventing new products that draw on behavioral insights. Ideas42 applies their expertise to a range of domains including consumer finance, education, economic opportunity, energy consumption and environmental conservation, healthcare, and criminal justice.

NYC Criminal Justice Agency

The New York City Criminal Justice Agency, Inc. (CJA), is a not-for-profit organization incorporated in 1977. CJA has over 200 employees in offices in all five boroughs of the City. CJA works under contract with the Mayor's Office of Criminal Justice and assists the courts and the City in reducing unnecessary pretrial detention. In accordance with this mission, CJA conducts a pre-arraignment interview and makes a release recommendation assessing individuals' likelihood of appearing for all required court hearings; notifies released individuals of upcoming court dates to promote appearance at all required court hearings; operates Supervised Release programs to serve those eligible who would otherwise be held in jail; assists alternatives-to-incarceration programs in screening individuals for a range of noncustodial sentencing sanctions; and provides information and research services to criminal justice policy makers, city officials, and the public.

The Mayor's Office of Criminal Justice

The Mayor's Office of Criminal Justice (MOCJ) advises the Mayor and First Deputy Mayor on criminal justice policy and is the Mayor's representative to the courts, district attorneys, defenders, and state criminal justice agencies, among others. The office designs, deploys, and evaluates citywide strategies to drive down crime, reduce unnecessary arrests and incarceration, and improve the system's fairness. MOCJ works with law enforcement, city agencies, nonprofits, foundations, and others to implement data-driven strategies that address current crime conditions, prevent offending, and build the strong neighborhoods that ensure enduring safety.

APPENDIX B – RESEARCH ADVISORY COUNCIL

Seven leading academic and policy experts generously contributed their expertise to this process by serving on the Research Advisory Council (RAC). The RAC reviewed analysis methods and results; requested additional analysis to be conducted; consulted on how the assessment might impact racial, ethnic, and other groups; and provided overall guidance and technical assistance. Participation in the RAC is not an endorsement of the updated CJA Release Assessment or the contents of this report.

GEOFFREY BARNES, PH.D., DIRECTOR OF CRIMINOLOGY FOR WESTERN AUSTRALIAN POLICE

Dr. Geoffrey Barnes is the Director of Criminology for the Western Australian Police, where he works on developing research-based policing strategies. He is also an Affiliated Lecturer in Evidence-Based Policing at the University of Cambridge's Institute of Criminology, and a Fellow of the Academy of Experimental Criminology. Previously, he held appointments at the University of Pennsylvania, University of Maryland, and Australian National University. His work involves utilizing machine learning to predict crime and forecast future criminal behavior.

MICHAEL KEARNS, PH.D., NATIONAL CENTER CHAIR AND PROFESSOR OF MANAGEMENT & TECHNOLOGY COMPUTER AND INFORMATION SCIENCE AT THE UNIVERSITY OF PENNSYLVANIA

Dr. Michael Kearns is a Professor and National Center Chair of Computer and Information Science at the University of Pennsylvania. He is also a Senior Advisor in Machine Learning and AI for Morgan Stanley, and a Fellow of the American Academy of Arts and Sciences, the Association for Computing Machinery, the Association for the Advancement of Artificial Intelligence, and the Society for the Advancement of Economic Theory. Previously, he worked for AT&T Bell Laboratories. His research interests involve machine learning, computational social science, and data science.

JON KLEINBERG, PH.D., TISCH UNIVERSITY PROFESSOR OF COMPUTER SCIENCE AT CORNELL UNIVERSITY

Dr. Jon Kleinberg is a Professor of Computing and Information Science at Cornell University. He is a member of the National Academy of Sciences, the National Academy of Engineering, and the American Academy of Arts and Sciences. His work has been supported by an NSF Career Award, an ONR Young Investigator Award, a MacArthur Foundation Fellowship, a Packard Foundation Fellowship, and a Sloan Foundation Fellowship. Much of his research focuses on machine learning, and how to minimize bias in the use of algorithms.

KRISTIAN LUM, M.S., PH.D., LEAD STATISTICIAN AT THE HUMAN RIGHTS DATA ANALYSIS GROUP

Dr. Kristian Lum is the Lead Statistician at the Human Rights Data Analysis Group, a nonprofit that applies rigorous data science to analysis of human rights violations around the world. Previously, Kristian worked as a Research Assistant Professor in the Virginia Bioinformatics Institute at Virginia Tech and as a Data Scientist at DataPad. Her research focuses on machine learning applied to predictions in the criminal justice system.

OJMARRH MITCHELL, PH.D., ASSOCIATE PROFESSOR OF CRIMINOLOGY & CRIMINAL JUSTICE AT ARIZONA STATE UNIVERSITY

Dr. Ojmarrh Mitchell is an Associate Professor of Criminology at Arizona State University. Previously, he held appointments at the University of South Florida, University of Cincinnati, University of Nevada Las Vegas, and the Urban Institute. He is also appointed to the U.S. Attorney General's Science Advisory Board. His research has been involved in the impact of race on sentencing, effectiveness of drug courts, and evaluations of juvenile justice facilities.

VINCENT SOUTHERLAND, L.L.M., J.D., EXECUTIVE DIRECTOR AT THE CENTER ON RACE, INEQUALITY, AND THE LAW AT NEW YORK UNIVERSITY SCHOOL OF LAW

Vincent Southerland is the Executive Director of the Center on Race, Inequality, and the Law, at New York University School of Law. He was previously an Assistant Federal Public Defender with the Federal Defenders for the Southern District of New York, a Senior Counsel at the NAACP Legal Defense and Educational Fund, a Staff Attorney at the Bronx Defenders, and an E. Barrett Prettyman Fellow and Georgetown University Law Center. He began his legal career as a law clerk to the Honorable Theodore McKee, of the United States Court of Appeals for the Third Circuit, and the Honorable Louis H. Pollak, of the United States District Court for the Eastern District of Pennsylvania. His work involves litigation, advocacy, and public education at the intersection of race and the criminal legal system.

SURESH VENKATASUBRAMANIAN, PH.D., PROFESSOR IN THE SCHOOL OF COMPUTING AT THE UNIVERSITY OF UTAH

Dr. Suresh Venkatasubramanian is a professor in the School of Computing at the University of Utah. He previously worked at AT&T Labs. He is also a member of the Computing Community Consortium Council of the Computing Research Association and a member of the board of the ACLU in Utah. His research interests are in the social ramifications of automated decision making, and algorithmic fairness.

APPENDIX C – 2003 CJA RELEASE ASSESSMENT REPORT

NEW YORK CITY CRIMINAL JUSTICE AGENCY Interview

INTERVIEW REPORT	CJA LOG Page	Line #	Precinct	Arrest #
	06	07	068	K19600999

Name:	**DOE, JOHN**		
Age:	**28**	Interview Date:	**2019-05-17**
DoB:	**1991-03-26**	Interview Time:	**11:47:00**
Sex:	**MALE**	CJA Interviewer:	**K999**
Hispanic?	**NO**	Interview Location:	**CB**
Race:	**WHITE**	Interview Language:	**ENGLISH**

Name (on this arrest) from NYSID/Arrest Report: **DOE, JOHN**
NYSID: **12345678J**
Arrest Date: **2019-05-16** Arrest Time: **01:09:00**
Arrest Charges: **1.** 120.20 **2.** VTL 1212 **3.** LOC 000V **4.** VTL 000.00

RESIDENCE/FAMILY

Current Address:	**1851 GODFREY ROAD,**	Prior Address:	**DOES NOT KNOW ADDRESS**
City, State, Zip:	**BROOKLYN, NY, 10036**	City, State, Zip:	**BROOKLYN, NY**
Lives With:	**Mother;Father;Brother;Sister**		
Contact:	**MOM DOE**	Contact:	**MOM DOE**
Relationship:	**MOTHER**	Relationship:	**MOTHER**
Phone #:	**929-999-9999**	Phone #:	**NA**
Length at Current Address:	Years Months Weeks	Length at Prior Address:	Years **DK** Months
	05	Contact still Resides at Prior Address?	**NO**
Alternate Address:		Expects Someone at Arraignment?	**NO**
City, State, Zip:		Name:	
Contact:		Relationship:	
Relationship:			
Phone #:			

EMPLOYMENT

Employed?	**FULL TIME**	Does Defendant Provide Support for Others?	**NO**
Job/Position:	**SALES MANAGER**	If "Yes" How Many?	
Employer:	**COFFEE RIDGE**	Other Sources of Financial Support:	**None**
Address:	**4201 GERALDINE LANE**		
City, State, Zip:	**BROOKLYN, NY**		
Length of Employment:	Months: **06**	Highest Grade:	**16**
Hours Worked/Week:	**40**	In School?	**NO**
Avg. Net Pay:	**35000**	Name:	
Pay Period:	**ANNUAL**	In Training Program?	**NO**
Length of Unemployment:		Name:	
Other Employment Status:		In Treatment Program?	**NONE**

CRIMINAL RECORD

First Arrest (Excluding Violations)?	Warrant Attached to NYSID?	Prior Warrant?	# of Prior Felony Convictions	# of Prior Misdemeanor Convictions	Open Cases
NO	**NONE**	**NO**	**1**	**2**	**0**

Gray Shading = Information from Official Sources

Miscellaneous Comments

LEGEND: **NP** = No Phone **DK** = Doesn't Know **NA** = Not Applicable **RA** = Refuses to Answer **NC** = Not Calculated **No Shading** = Information from Defendant

This report assesses the defendant's risk of flight by considering the following: community ties and warrant history as defined in sections 2(a)(ii) and 2(a)(iii)&(vi) of CPL 510.30 and open cases. However, a positive assessment is withheld for defendants with outstanding bench warrants attached to their NYSID sheet at the arrest. This report does not consider other criteria listed in CPL 510.30 such as the defendant's mental condition, the weight of the evidence, or the possible sentence.

DEFENDANT'S RESPONSE VERIFICATION				CJA RECOMMENDATION
1	Has the defendant lived at his/her current address for 1.5 years or more?	**YES**		**RECOMMENDED FOR ROR**
2	Does the defendant live with parent, spouse, C/L spouse of 6 months, grandparent, or legal guardian?	**YES**		
3	Does the defendant have a working telephone in residence/cell phone?	**YES**	**1**	
4	Does the defendant report a NYC area address?	**YES**	**0**	
5	Is the defendant employed, or in school or training program, full time?	**YES**	**1**	
6	Does the defendant expect someone at arraignment?	**NO**	**-1**	
7	Does Prior Warrant equal Zero?	**YES**	**5**	
8	Does Open Case equal Zero?	**YES**	**1**	
		TOTAL POINTS	**7**	

Verification Reference Source: NO CONTACTS PROVIDED

CJA is not the official source of data provided in gray-shaded area

APPENDIX D – 2003 CJA RELEASE ASSESSMENT BIVARIATE ANALYSIS

Bivariate Analysis of Factors and FTA (Test Subset, Released Arrest Cycles, N = 59,181)[35]

Factor	Values	Total N	Total percent	FTA N	FTA rate	X^2	*p*	Phi
Does the defendant report a NYC area address?	Yes verified	14,248	24.7	1,249	8.8	396.635	.000	.083
	Yes unverified/unresolved conflict	40,357	69.9	5,517	13.7			
	No unverified or verified	3,090	5.4	632	20.5			
Does the defendant have a working telephone in residence/cellphone?	Yes unverified or verified	47,289	82.0	5,203	11.0	787.595	.000	.117
	Unresolved conflict	1,111	1.9	200	18.0			
	No unverified or verified	9,295	16.1	1,995	21.5			
Is the defendant employed, or in school or training program, full time?	Yes unverified or verified	28,383	49.2	2,813	9.9	429.026	.000	.086
	No unverified or verified	28,068	48.6	4,417	15.7			
	Unresolved conflict	1,244	2.2	168	13.5			
Does the defendant expect someone at arraignment?	Yes	21,324	37.0	2,378	11.2	84.478	.000	-.038
	No/doesn't know	36,371	63.0	5,020	13.8			
Does prior warrant equal zero?	Yes	37,831	65.6	3,375	8.9	1,496.126	.000	-.161
	No	19,864	34.4	4,023	20.3			
Does open case equal zero?	Yes	43,368	75.2	4,728	10.9	576.269	.000	-.100
	No	14,327	24.8	2,670	18.6			

[35] The test subset contains 59,181 arrest cycles where a person was released prior to trial. However, a subset of these arrest cycles (N = 1,486) have missing or unscorable interview information, and therefore cannot be scored under either the 2003 or updated CJA Release Assessment. To that end, the bivariate analysis is conducted on released cycles in the test subset for which a score can be calculated (N = 57,695). When conducting bivariate analysis for the 2003 CJA Release Assessment (in Appendix D) and updated CJA Release Assessment (in Appendix E), expungement logic is not applied for purposes of comparison.

Bivariate Analysis of Score and FTA[36]

Score	N	Percent	FTA N	FTA rate
-13	0	0.0	-----	-----
-12	243	0.4	95	39.1
-11	0	0.0	-----	-----
-10	1,120	1.9	358	32.0
-9	75	0.1	19	25.3
-8	1,722	3.0	480	27.9
-7	1,832	3.2	436	23.8
-6	1,009	1.7	251	24.9
-5	4,532	7.9	937	20.7
-4	691	1.2	119	17.2
-3	3,821	6.6	659	17.2
-2	1,505	2.6	234	15.5
-1	1,226	2.1	191	15.6
0	2,213	3.8	382	17.3
1	54	0.1	15	27.8
2	2,672	4.6	411	15.4
3	1,488	2.6	219	14.7
4	1,817	3.1	236	13.0
5	7,945	13.8	808	10.2
6	845	1.5	77	9.1
7	10,818	18.8	793	7.3
8	2,071	3.6	142	6.9
9	3,482	6.0	197	5.7
10	4,115	7.1	225	5.5
11	8	0.0	-----	-----
12	2,391	4.1	114	4.8
Base Rate	12.8			
AUC-ROC	0.670			

[36] FTA and appearance rates are not presented for scores with less than 50 arrest cycles due to the instability of small samples. There is small percentage of cycles for which scores cannot be calculated (N = 1,486) which are excluded from the analysis, resulting in a difference between the full population base FTA rate (13.0) and completed interview base FTA rate (12.8).

APPENDIX E – UPDATED CJA RELEASE ASSESSMENT BIVARIATE ANALYSIS

Bivariate Analysis of Factors and FTA (Test Subset, Released Arrest Cycles, N = 59,181)[37]

Factor	Values	Total N	Total percent	FTA N	FTA rate	X^2	*p*	Phi
Years since last bench warrant	Within last year	5,375	9.3	1,637	30.5	2,197.159	.000	.195
	1 to 2 years	2,193	3.8	524	23.9			
	2 to 5 years	3,534	6.1	646	18.3			
	No prior BW in last 5 years	46,593	80.8	4,591	9.9			
Two or more bench warrants in last 5 years	Yes	4,804	8.3	1,438	29.9	1,372.522	.000	.154
	No	52,891	91.7	5,960	11.3			
Misdemeanor/felony conviction in last year	1 or more	6,090	10.6	1,481	24.3	804.959	.000	.118
	None	51,605	89.4	5,917	11.5			
Misdemeanor convictions in last 3 years	3 or more	3,041	5.3	880	28.9	1,011.673	.000	.132
	2	1,970	3.4	388	19.7			
	1	4,970	8.6	858	17.3			
	None	47,714	82.7	5,272	11.0			
Felony convictions in last 10 years	1 or more	7,387	12.8	1,279	17.3	152.894	.000	.051
	None	50,308	87.2	6,119	12.2			
Pending cases	1 or more	15,353	26.6	2,917	19.0	714.048	.000	.111
	None	42,342	73.4	4,481	10.6			
Years living at last two addresses	No address	1,431	2.5	421	29.4	546.702	.000	.097
	Less than 3 years	8,490	14.7	1,439	16.9			
	3 or more years	47,774	82.8	5,538	11.6			
Reachable by phone	No	9,295	16.1	1,995	21.5	740.023	.000	.113
	Yes	48,400	83.9	5,403	11.2			

[37] The test subset contains 59,181 arrest cycles where a person was released prior to trial. However, a subset of these cycles (N = 1,486) have missing or unscorable interview information, and therefore cannot be scored under either the 2003 or updated CJA Release Assessment. To that end, the bivariate analysis is conducted on released arrest cycles in the test subset for which a score can be calculated (N = 57,695). When conducting bivariate analysis for the 2003 CJA Release Assessment (in Appendix D) and updated CJA Release Assessment (in Appendix E), expungement logic is not applied for purposes of comparison.

APPENDIX E (CONTINUED) – UPDATED CJA RELEASE ASSESSMENT BIVARIATE ANALYSIS

Bivariate Analysis of Score and FTA & Appearance Rates[38]

Score	N	Percent	FTA N	FTA rate	Appearance rate
0	11	0.0	3	-----	-----
1	34	0.1	20	-----	-----
2	12	0.0	8	-----	-----
3	55	0.1	26	47.3	52.7
4	66	0.1	29	43.9	56.1
5	86	0.1	35	40.7	59.3
6	190	0.3	75	39.5	60.5
7	114	0.2	42	36.8	63.2
8	329	0.6	123	37.4	62.6
9	444	0.8	162	36.5	63.5
10	346	0.6	94	27.2	72.8
11	714	1.2	217	30.4	69.6
12	653	1.1	207	31.7	68.3
13	945	1.6	264	27.9	72.1
14	1,508	2.6	408	27.1	72.9
15	738	1.3	152	20.6	79.4
16	2,045	3.5	492	24.1	75.9
17	1,566	2.7	380	24.3	75.7
18	1,225	2.1	230	18.8	81.2
19	2,462	4.3	438	17.8	82.2
20	2,694	4.7	421	15.6	84.4
21	1,895	3.3	258	13.6	86.4
22	9,508	16.5	1,116	11.7	88.3
23	3,891	6.7	365	9.4	90.6
24	2,250	3.9	246	10.9	89.1
25	23,914	41.4	1,587	6.6	93.4
Base Rate	12.8				
AUC-ROC	0.677				

[38] FTA and appearance rates are not presented for scores with less than 50 arrest cycles due to the instability of small samples. There is small percentage of arrest cycles for which scores cannot be calculated (N = 1,486) which are excluded from the analysis, resulting in a difference between the full population base FTA rate (13.0) and completed interview base FTA rate (12.8).

Pretrial Release Assessment

Name on NYSID/Arrest Report Doe, John		**First Arrest** No	
NYSID 09991100J			
		Arrest Charges (up to 4)	
Age 30	**Precinct** 014	**1.** 155.25	**2.**
Sex Male	**Arrest #** 000000	**3.**	4.

CJA Interview		**Interview Date & Time** 12-01-19 12:00 AM **Language & Service Type**
Address Yes, Verified 3146 Alfred Drive Brooklyn, N.Y. 11206 **Phone** Yes, Verified (212) 555-1234 **Lives with** Mother **Caretaker for Others** No	**Employed** Full-time **Length of Employment** 3 yr. **Job/Position** Ramp Agent **Employer** JFK **Est. Monthly Net Income** $1,234 **Financial Support for Others** No	**In School** No **In Training Program** No **In Treatment Program** No Served in the U.S. Armed Forces, National Guard, or Reserves
CJA Notes		

Release Assessment Scoring

	Assessment Factors	Cycles Considered/Details	Points
		All start with 25 points	**25**
A	Years since last bench warrant **N/A**	No counted warrants from last 5 years	**0**
B	Two or more bench warrants in last five years **No**		**0**
C	Misdemeanor or felony convictions in last year **0**		**0**
D	Misdemeanor convictions in last three years **0**		**0**
E	Felony convictions in last ten years **0**		**0**
F	Pending cases **1+**	Cycle/Date: 2 (10-29-2019)	**-3**
G	Years living at last two addresses **3+**	Current Address: 3 years Prior Address: 2 years	**0**
H	Reachable by phone **Yes**		**0**

* Indicates Potential Discrepancy

Total Score **22/25**

Of those released with this score: **87 out of 100** return for all required court appearances

Reappearance Score and Recommendation Key

Score	0-3	4-6	7-8	9-11	12-15	16-18	19-20	**21-22**	23-24	25
Reappearance Rate (# out of 100)	42	50	56	63	71	76	82	**87**	89	93
Recommendation	ROR Not Recommended				Misd ROR	Misd/NVF ROR	ROR			
					NVF/VFO Consider all options	VFO Consider all options				

CJA Recommendation

ROR

01-01-2020 12:38 PM