



Pretrial Risk Assessment Tool Validation

PRETRIAL PILOT PROGRAM

COUNTY OF LOS ANGELES

JULY 2021



JUDICIAL COUNCIL
OF CALIFORNIA

OPERATIONS AND PROGRAMS DIVISION
CRIMINAL JUSTICE SERVICES

Impact of COVID-19 Pandemic on Pretrial Pilot Program

The Budget Act of 2019 requires that Pretrial Pilot Program courts collaborate with local justice system partners to make data available to the Judicial Council as required to measure the outcomes of the pilots. Senate Bill 36 (Hertzberg; Stats. 2019, ch. 589) established tool validation and reporting requirements for pretrial services agencies using a pretrial risk assessment tool; these requirements are mandatory for all pilot projects.

Throughout much of period covered by this report, the United States experienced the COVID-19 global pandemic. On March 4, 2020, Governor Gavin Newsom declared a state of emergency to protect public health and safety, and formalized efforts by the California Department of Public Health, California Health and Human Services Agency, Governor's Office of Emergency Services, and other state agencies and departments to mitigate this public health crisis. On March 19, 2020, orders from the Governor and the California Department of Public Health directed all California residents to stay home except when performing essential jobs or shopping for necessities.

On March 27, 2020, the Governor issued an order that gave the Judicial Council of California and the Chief Justice authority to adopt emergency rules and take other necessary actions to respond to the COVID-19 health and safety crisis. The Judicial Council adopted various emergency measures to support courts in providing essential services while helping to safely reduce jail populations. These measures, together with policies adopted by individual courts in response to the crisis, have impacted the population eligible for participation in the Pretrial Pilot Program.

On April 6, 2020, the Judicial Council adopted a statewide emergency bail schedule that set presumptive bail at \$0 for most misdemeanors and lower-level felonies, with specified exceptions, but retained court discretion in setting bail. The emergency rule was intended to safely reduce jail populations and protect justice system personnel and public health while promoting consistency in pretrial release and detention throughout the state. The Judicial Council repealed the emergency bail schedule rule effective June 20, 2020, but encouraged courts to adopt local emergency bail schedules with \$0 bail or significantly reduced bail levels to meet their county's public health and safety conditions.

As a result of local criminal justice system policies and the emergency bail schedule, pilot courts observed significant reductions in booking rates and jail populations during this time. Under these temporary emergency policies, many individuals who would otherwise have been eligible for program participation were cited and released in the field or released on \$0 bail upon booking without undergoing a risk assessment. Crime and arrest patterns were also likely affected by COVID-19 and shelter-in-place orders. Criminal case dispositions also slowed during this time period.

Therefore, the population of program participants is very likely different than would be seen in the absence of the pandemic, both in terms of reduced numbers and composition. In addition, the validation analyses in this report are limited to bookings with final dispositions in order to observe the full pretrial period. As California emerges from the COVID-19 pandemic, we anticipate that program participation will grow, with more individuals served.

LOS ANGELES PSA VALIDATION INTRODUCTION

LEGISLATIVE MANDATE

This report fulfills the legislative mandates of the Budget Act of 2019 (Assem. Bill 74; Stats. 2019, ch. 23), and Senate Bill 36 (Sen. Bill 36; Stats. 2019, ch. 589). In AB 74, the Legislature directed the Judicial Council to administer two-year pretrial projects in trial courts. The goals of the Pretrial Pilot Program, as set by the Legislature, are to:

- Increase the safe and efficient prearrestment and pretrial release of individuals booked into jail;
- Implement monitoring practices with the least restrictive interventions necessary to enhance public safety and return to court;
- Expand the use and validation of pretrial risk assessment tools that make their factors, weights, and studies publicly available; and
- Assess any disparate impact or bias that may result from the implementation of these programs.

SB 36 requires each pretrial services agency that uses a pretrial risk assessment tool to validate the risk assessment tool used by the agency by July 1, 2021, and on a regular basis thereafter, and to make specified information regarding the tool, including validation studies, publicly available. AB 74 provided funding to the Judicial Council “for costs associated with implementing and evaluating these programs, including, but not limited to “...Assisting the pilot courts in validating their risk assessment tools.” This report, in accordance with [AB 74](#) and [SB 36](#), provides information on the validation of the PSA pretrial risk assessment tools used by Los Angeles.

SB 36 requires pretrial risk assessment tools to be validated. SB 36 defines validate as:

(4) “Validate” means using scientifically accepted methods to measure both of the following:

(A) The accuracy and reliability of the risk assessment tool in assessing (i) the risk that an assessed person will fail to appear in court as required and (ii) the risk to public safety due to the commission of a new criminal offense if the person is released before the adjudication of the current criminal offense for which they have been charged.

(B) Any disparate effect or bias in the risk assessment tool based on Gender, Race, or ethnicity.

(Sen. Bill 36, § 1320.35(b)(4).)

VALIDATION METHODS

Descriptive statistics are presented, exploring basic features of the data such as demographics and the overall distributions of arrest offenses and adverse outcomes. The distributions of risk scores are shown in groupings of risk level defined by the tool developer.

A Receiver Operating Characteristic curve (ROC) model has been used to provide the Area Under the Curve (AUC) statistic for each outcome of interest. The outcomes of interest are:

- Failure to Appear (FTA)
- New arrest
- New filing
- New conviction
- New violent arrest

The AUC value is a single number that represents the ability of the tool to differentiate between individuals who are lower or higher risk across the range of the tool. The AUC is calculated for each outcome overall and separately for each gender and race/ethnicity group to examine whether the ability of the tool to differentiate individuals by risk differs by gender or race/ethnicity.

For criminal justice risk assessments, a common metric for evaluating AUC values is derived from Desmarais and Singh (2013)¹, who defined AUC values less than 0.55 as poor, 0.55-0.63 as fair, 0.64-0.70 as good, and 0.71-1.00 as excellent.

The observed rate of adverse outcomes at each score is presented. The pattern of these rates is an indicator of the accuracy of the tool, showing whether risk scores predict monotonic increasing failure rates for each outcome of interest.

Logistic regression is used to test whether risk scores statistically significantly predict the likelihood of each outcome of interest, and whether any differences in outcomes by risk level across gender or race/ethnicity are statistically significant. Statistical significance is a technical term used in analyses to indicate that it is very unlikely that a result or difference occurred by chance. Statistical significance does not necessarily indicate the size of the result or difference.

To measure any predictive bias in the tools, fitted curves of the rates of adverse outcomes at each score are shown separately by gender and race/ethnicity groups. Logistic regression has been used to test whether the likelihood of each outcome of interest by risk level differs statistically significantly across gender or race/ethnicity groups.

The risk scores presented in this report are calculated using a scoring scheme designed by the tool developers. The tool takes into account aspects of an individual's criminal history, current criminal offense, history of failures to appear in court, age, and other factors (see Appendix A, Tables 1 and 2 for the factors and weights specific to each subscale of the PSA). Gender and race are not used to calculate risk scores.

This report solely analyses risk scores and associated outcomes for individuals who were released from custody pretrial. Individuals may have been released in a variety of ways by the Sheriff or judge, including on bail. This report does not look at judicial decision-making or judges' use of the risk assessment tool.

¹ Desmarais, S. L., & Singh, J. P. (2013). Risk assessment instruments validated and implemented in correctional settings in the United States. *Lexington, KY: Council of State Governments.*

Further research is needed to analyze the elements that may be driving the observed differences and whether there are data-driven modifications to the tools' risk factors or weights that can further improve the predictive power of the tool.

DEFINITIONS

- **Pretrial period** is the time period starting at booking of an individual at the jail and ending at resolution of any and all cases associated with that booking.
- **Failure to appear (FTA)** is measured using court records documenting issuance of a bench warrant for FTA during the pretrial period.
- **New arrest**² is any new arrest during the pretrial period reported to the CA DOJ.
- **New filing** is any new arrest during the pretrial period that results in charges filed with the court and reported to the CA DOJ.³
- **New conviction** is any new arrest during the pretrial period that results in a conviction reported to the CA DOJ during the data collection period.⁴
- **New violent arrest** is any new arrest during the pretrial period for an offense on the list of PSA Pretrial Pilot consensus violent offense list, which includes felonies and misdemeanors of a violent nature. For the full list of offenses see Appendix B.

VALIDATION SAMPLE SIZES

For purposes of this report, general validation results are shown when the sample size was greater than 200. For analyses of predictive bias by race/ethnicity and gender, subgroup results are shown when the overall sample was at least 1,000 and each subgroup size was greater than 200. Sample sizes smaller than these may not produce reliable results. Los Angeles meets sample size requirements for both general validation and analyses of predictive bias.

DATA DESCRIPTION AND LIMITATIONS

The data set for the pretrial risk assessment tool validation was created using data from the court and two agencies in the county, as well as statewide data from the California Department of Justice.

DATA SOURCES

- **Jail booking data:** Los Angeles County sheriff's office provided information on all individuals booked into local county jail, including booking dates, charges, and releases.

² New criminal offenses are defined in four different ways to capture different outcomes of interest. All new criminal offense indicators are measured using data from the California Department of Justice (CA DOJ).

³ CA DOJ records on arrests are likely more complete than CA DOJ records on court filings and dispositions. Court reporting to the CA DOJ is incomplete.

⁴ Due to the short timeframe of the data collection period and delays in court reporting to the CA DOJ, new convictions may not be a complete measure of all arrests during the pretrial period that result in a conviction.

- **Probation data:** Los Angeles County probation department provided pretrial risk assessment information which included assessment dates and scores.
- **Court case data:** Los Angeles County superior court provided court case information, including pretrial disposition dates and the issuance of warrants for failures to appear for those with felony or misdemeanor criminal filings.
- **California Department of Justice Data (CA DOJ) data:** The California Department of Justice provided arrest and disposition data, including out-of-county filings, for booked defendants.

DATE RANGE

The time period for this validation extends from March 23, 2020 to December 31, 2020.

DATA LINKING AND FILTERING

After data were collected from each source, they were standardized and linked together to create a validation dataset of bookings with associated pretrial risk assessment information, relevant court case information, and outcomes during the pretrial period. Local justice agencies keep separate data systems, and not all data were able to be matched across agencies. Due to the limited timeframe of the data and the effects of COVID-19 on court operations, data are likely skewed towards dispositions that occur in a shorter time frame compared to all dispositions, and many individuals who were released pretrial may not have had final dispositions during the data collection period and therefore could not be included in the validation sample. The only bookings included in the validation dataset were those for which the individual was released pretrial and there was a final disposition associated with the booking because outcomes during the pretrial period were a primary interest of this analysis and also so that the full pretrial period could be observed. This report refers to each booking linked with an associated assessment and completed pretrial period as a “pretrial observation.”

The table below shows the number of assessments at each stage of filtering, and the type of validation that will be presented based on the sample size.

Table A - Counts of all assessments at each stage of filtration for evaluation sample

Tool Name	County	Assessments	Assessed Bookings	Pretrial Complete	Validation Dataset	Validation Type
PSA	Los Angeles	73,437	72,594	29,926	13,247	General + Bias

DESCRIPTIVE STATISTICS

DEMOGRAPHICS

Table B provides the number of assessments in the evaluation dataset, the racial/ethnic and gender makeup, and the median age.⁵

Table B - Demographic Profile of Evaluation Dataset

County	Total	Race/Ethnicity (%)				Gender (%)		Median Age
		Black	White	Hispanic	Other	Male	Female	
Los Angeles	13,247	20	17	59	4	81	19	30

ARREST OFFENSES

Felony arrests represented the majority of bookings (56%); misdemeanor arrests were a smaller share (44%). Violent offenses⁶ represented 20% of bookings in the dataset, while property offenses were 20% and drug offenses 30% of bookings in the dataset. DUI offenses were 13% of bookings, while DV offenses made up 15% of bookings in the evaluation dataset.

Table C - Distribution of Arrest Offense Type

County	Felony	Misdemeanor	Violent	Property	Drug	DUI	DV
Los Angeles	56	44	20	20	30	13	15

ADVERSE OUTCOMES

Several different adverse outcomes are measured during the pretrial period from pretrial release to disposition. Failure to appear (FTA), measured as bench warrants issued for FTA during the pretrial period were recorded for 7.1% of pretrial observations. New arrests during the pretrial period were recorded for 37.2% of pretrial observations. New arrests during the pretrial period resulting in filed charges were recorded for 15.6% of pretrial observations, and new arrests during the pretrial period resulting in convictions were recorded for 11.3% of pretrial observations.⁷ New violent arrests⁸

⁵ Non-binary, other, and unknown genders represented less than 0.1% of the bookings in the evaluation dataset.

⁶ Violent offenses as defined by the pilot consensus PSA Violent Offense List, see Attachment A. These include both felonies and misdemeanors that are violent in nature.

⁷ New arrest, new filing, and new conviction data are measured using CA DOJ data. New arrests and new violent arrests are reported to the CA DOJ from arresting agencies, whereas new filings and new convictions are reported to the CA DOJ from courts. The CA DOJ may have incomplete records of filings and convictions from the courts because of difficulties or delays in reporting, and not all new arrests during the pretrial period may have been resolved during the data collection period.

⁸ New violent arrests are defined by the PSA Violent Offense List (see footnote 6 above)

(including felony and misdemeanor arrests for offenses of a violent nature) were recorded during the pretrial period for 8.6% of pretrial observations.

Table D - Rates of Pretrial Misconduct

County	FTA	New Arrest	New Filing	New Conviction	New Violent Arrest
Los Angeles	7.1	37.2	15.6	11.3	8.6

CONDITIONS OF MONITORING/SUPERVISION

In Los Angeles, the PSA is used for pre-arraignment release decisions only; supervised release is not provided at this stage. Any supervision conditions applied at later decision points are not analyzed in these data. Further research is needed to determine the impact of supervision conditions and to separate out the efficacy of the tool from the efficacy of supervision conditions.

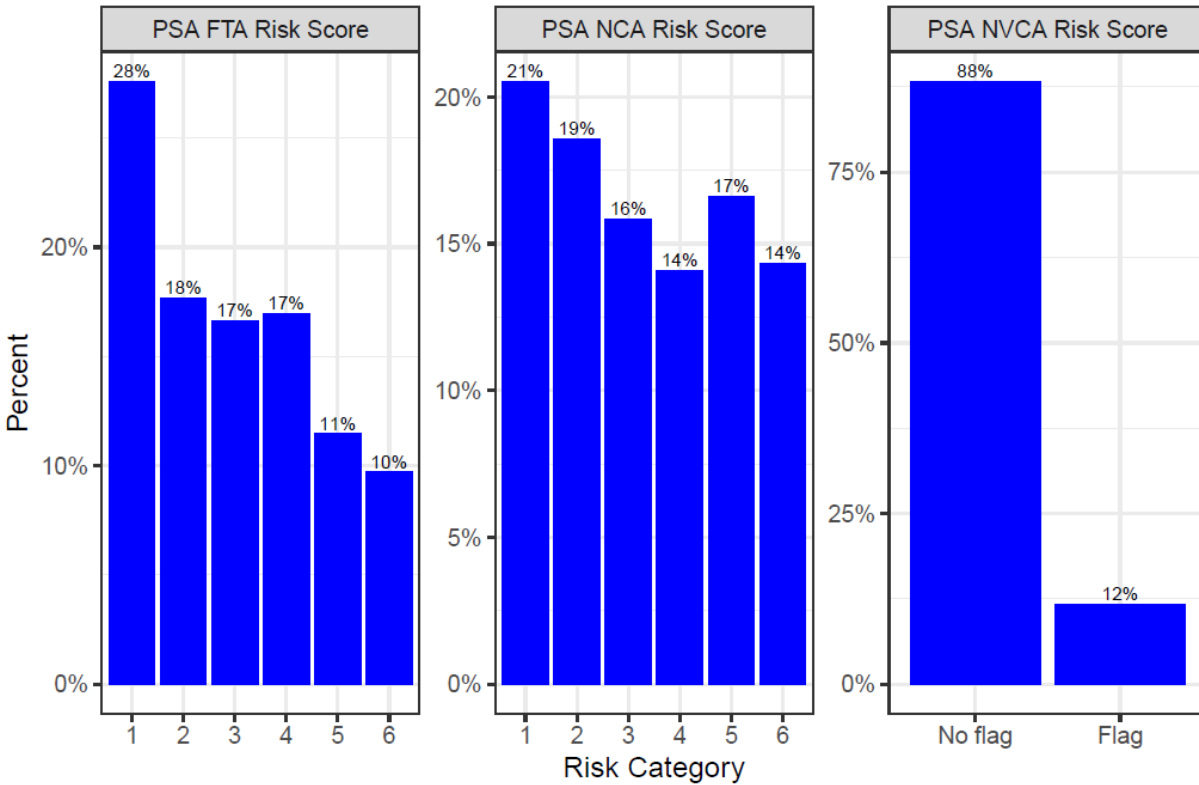
LOS ANGELES PSA VALIDATION

GENERAL VALIDATION

The following charts show the distribution of risk levels for individuals in Los Angeles in the evaluation dataset assessed with the PSA tool, for each PSA subscale. The PSA FTA subscale was designed to predict the risk of failure to appear in court. The PSA NCA scale was designed to predict the risk of a new arrest, and the PSA NVCA flag was designed to predict new arrest for a violent crime. As determined by the tool developers, the FTA and NCA subscales are each divided into 6 risk levels with 1 representing the lowest risk and 6 the highest, and the NVCA subscale is divided into a binary flag, such that a flag represents higher risk of new violent crime and no flag represents lower risk of new violent crime.⁹ Lower scores were more common for both the FTA and NCA subscales, and a small fraction of assessed individuals received a NVCA flag.

⁹ The NVCA subscale is scaled to a 1-6 scale, and then scores 1-3 are categorized as no flag and scores 4-6 are categorized as flagged.

Los Angeles Distribution of Assessments by PSA Risk Category



PSA FTA Risk Score	Total	PSA NCA Risk Score	Total	PSA NVCA Risk Score	Total
1	3,653	1	2,718	0	11,688
2	2,340	2	2,460	1	1,559
3	2,202	3	2,098		
4	2,247	4	1,868		
5	1,519	5	2,203		
6	1,286	6	1,900		

The following table shows the AUC values for the PSA scales for each outcome of interest. The AUC value is a single number that represents the ability of the tool to differentiate between individuals who are lower or higher risk across the range of the tool. For criminal justice risk assessments, a common metric for evaluating AUC values is derived from Desmarais and Singh (2013)¹⁰, who defined AUC values less than 0.55 as poor, 0.55-0.63 as fair, 0.64-0.70 as good, and 0.71-1.00 as excellent. By these definitions, the AUC values for the PSA are excellent for new arrest and for new filing, are good for new conviction and FTA, and fair for new violent arrest.

The 95% confidence interval is also shown, which represents the range of AUC estimates the true AUC value is statistically 95% likely to fall between. A smaller range indicates that given the size of the sample

¹⁰ Desmarais, S. L., & Singh, J. P. (2013). Risk assessment instruments validated and implemented in correctional settings in the United States. *Lexington, KY: Council of State Governments.*

and pattern of the data, the AUC can be estimated with greater precision. None of the 95% confidence intervals fall below the fair range.

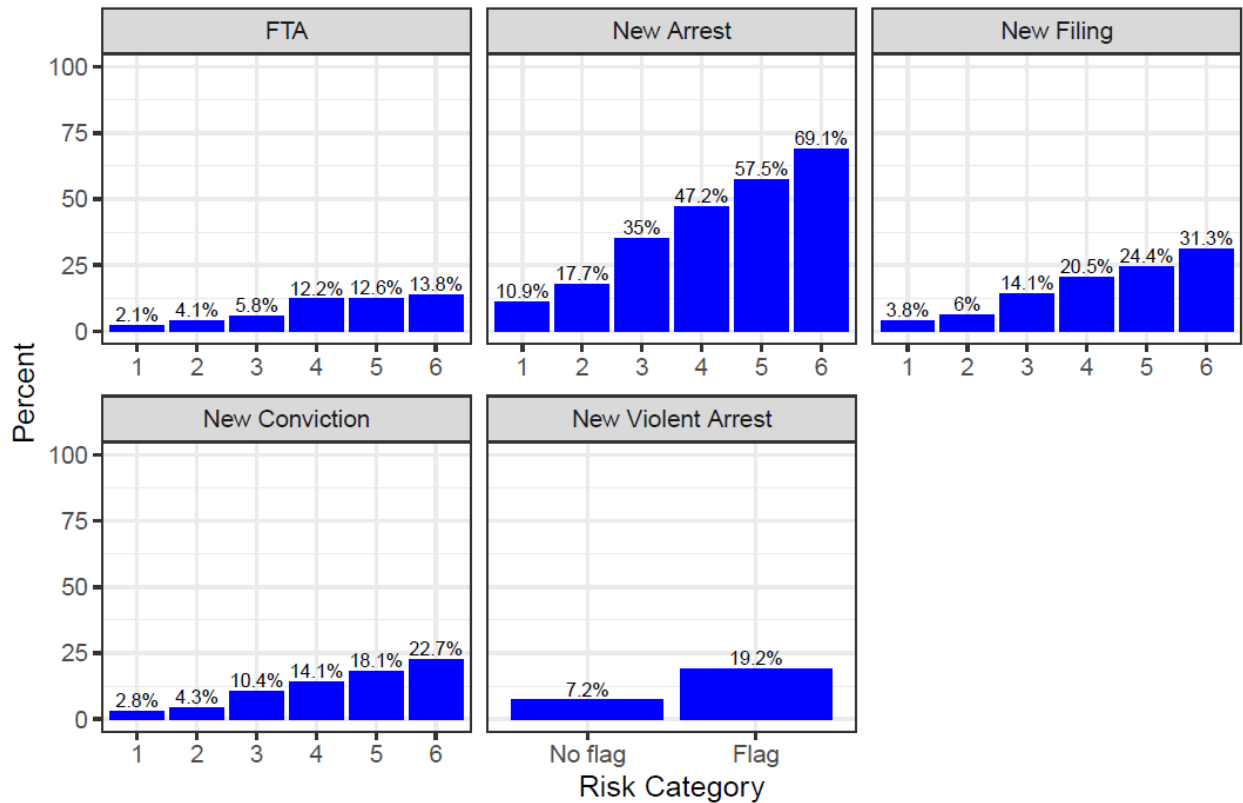
Risk Score	Outcome	AUC	CI (95%)
PSA FTA	FTA	0.688	0.672-0.704
PSA NCA	New Arrest	0.754	0.746-0.762
PSA NCA	New Filing	0.711	0.7-0.723
PSA NCA	New Conviction	0.702	0.689-0.715
PSA NVCA	New Violent Arrest	0.579	0.566-0.592

^a N = 13247

The following series of charts shows the rate of various adverse outcomes during the pretrial period at each risk level of the PSA, using each of the PSA subscales for the relevant outcomes. The PSA-FTA risk scale is used for the outcome of FTA. The PSA-NCA risk scale is used for the outcomes of new arrest, new filing, and new conviction. The PSA-NVCA risk flag is used for the outcome of new violent arrest. For each outcome of interest¹¹, observed rates of the outcome increase as the assessed risk level increases. This pattern is consistent across all outcomes and risk levels.

¹¹ See validation methodology section for definitions of each outcome of interest

Los Angeles PSA Outcomes by Risk Category



The following table shows the results from logistic regression models predicting each outcome of interest. The models control for the number of days the defendant spent released during the pretrial period. For each outcome of interest, the models show that the relevant PSA risk score is statistically significantly ($p < 0.001$) associated with the likelihood of the outcome during the pretrial period.

	<i>Dependent variable:</i>				
	FTA (1)	New Arrest (2)	New Filing (3)	New Conviction (4)	New Violent Arrest (5)
PSA FTA Risk Score	0.389*** (0.021)				
PSA NCA Risk Score		0.602*** (0.013)	0.455*** (0.016)	0.426*** (0.018)	
PSA NVCA Risk Score					1.185*** (0.075)
Days Released	0.001 (0.0005)	0.010*** (0.0003)	0.008*** (0.0003)	0.007*** (0.0004)	0.007*** (0.0004)
Constant	-3.961*** (0.098)	-3.690*** (0.067)	-4.279*** (0.086)	-4.479*** (0.096)	-3.397*** (0.066)
Observations	13,247	13,247	13,247	13,247	13,247
Log Likelihood	-3,216.740	-6,858.571	-4,977.744	-4,157.602	-3,637.706
Akaike Inf. Crit.	6,439.481	13,723.140	9,961.489	8,321.205	7,281.411

Note:

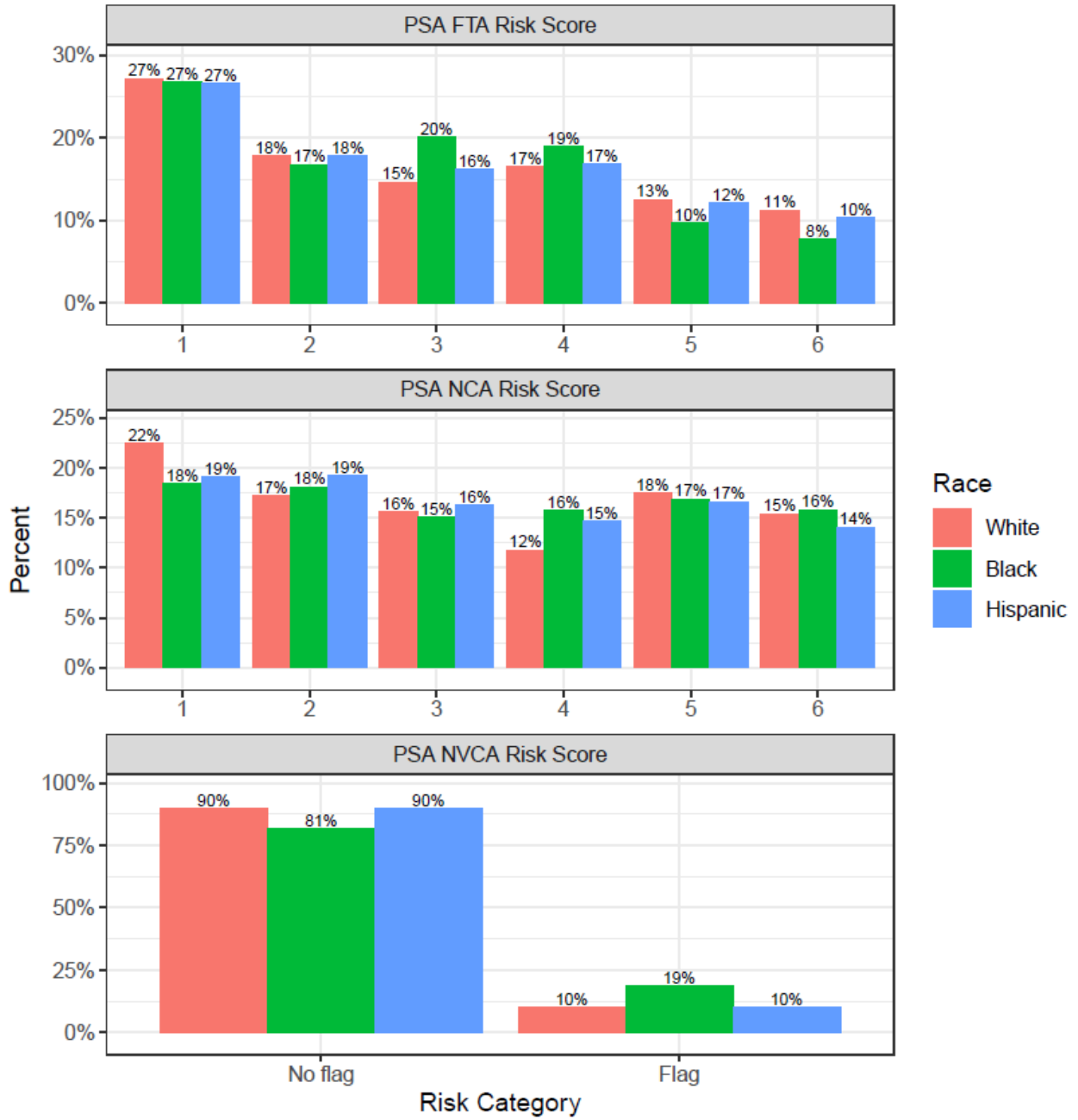
*p<0.05; **p<0.01; ***p<.001

ANALYSIS OF PREDICTIVE BIAS

RACE

The following chart shows the distribution of risk assessment scores by race/ethnicity. The distribution of scores varies by race/ethnicity most notably for NVCA score, on which Black individuals in the sample scored in the flagged category more often than white or Hispanic individuals in the sample.

Los Angeles Distribution of Assessments by PSA Risk Category



PSA FTA Risk Score	White	Black	Hispanic
1	598	725	2,071
2	393	455	1,388
3	323	544	1,261
4	364	515	1,312
5	276	263	940
6	247	211	804

PSA NCA Risk Score	White	Black	Hispanic
1	494	499	1,489
2	380	491	1,493
3	343	410	1,267
4	259	426	1,139
5	386	458	1,293
6	339	429	1,095

PSA NVCA Risk Score	White	Black	Hispanic
No flag	1,978	2,210	6,982
Flag	223	503	794

The number of assessed individuals in each race/ethnicity group is sufficient to run statistical tests that look at how the PSA tool scales performed by race/ethnicity.

The following table shows the AUC values¹² and 95% confidence intervals for each outcome of interest and relevant PSA risk subscale separately for each race/ethnicity group. Except for AUC values for new violent arrests which are in the fair range, all other AUC values are in the good to excellent range. Statistical testing¹³ indicates a statistically significant difference between Black and Hispanic AUCs for new arrest. The Hispanic AUC is higher than the Black AUC, indicating that the PSA NCA subscale has a stronger ability to distinguish between individuals who are lower or higher risk for Hispanic individuals than Black individuals for the outcome of new arrest, though the AUC for both groups is in the excellent range. No other statistically significant differences in AUC by race/ethnicity were found.

¹² See p. 4 for description of the meaning of AUC values.

¹³ DeLong's test for two ROC curves

Risk Score	Outcome	AUC			CI (95%)		
		White	Black	Hispanic	White	Black	Hispanic
PSA FTA	FTA	0.693	0.680	0.686	0.651-0.735	0.644-0.715	0.666-0.706
PSA NCA	New Arrest	0.749	0.733	0.761	0.728-0.769	0.714-0.753	0.75-0.771
PSA NCA	New Filing	0.698	0.706	0.714	0.672-0.725	0.678-0.734	0.7-0.728
PSA NCA	New Conviction	0.687	0.689	0.707	0.655-0.719	0.654-0.724	0.692-0.722
PSA NVCA	New Violent Arrest	0.559	0.586	0.579	0.526-0.591	0.557-0.615	0.563-0.596

^a N White = 2201 , N Black = 2713 , N Hispanic = 7776

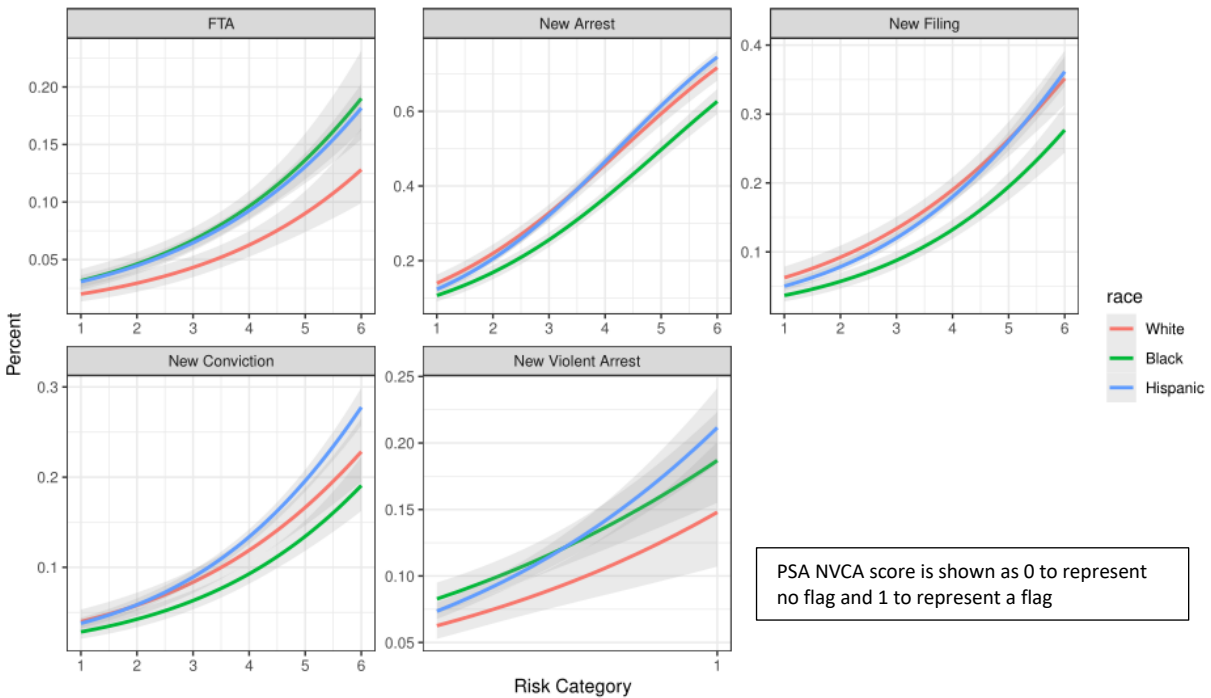
The following series of charts show the results of statistical models of the predictive power of the relevant PSA subscale for each outcome of interest for each race/ethnicity group. Each line represents the probability of each outcome of interest at each risk level separately for each race/ethnicity. The grey area around each line represents a 95% confidence interval – where the grey areas do not overlap the evidence indicates there is likely a true difference between the groups, where the grey areas overlap the evidence may not be strong enough to conclude that there are differences between them.

For new violent arrest and new convictions the confidence intervals of the Black and Hispanic lines overlap with those of the white lines, indicating that there is no evidence of a difference in the likelihood of those outcomes for Black or Hispanic individuals as compared to white individuals with the same score, at any risk level. The confidence intervals are notably wider for the new violent arrest outcome, because new violent arrest is a rarer outcome which diminishes the ability of the model to make precise predictions.

For FTA the lack of overlap between the confidence intervals over some ranges of the tool indicates that there is evidence that for the mid-range of the tool, white individuals have lower FTA rates than Black or Hispanic individuals with the same score.

For new arrest and new filing, the lack of overlap between the confidence intervals over most of the ranges of the tool indicates that there is evidence that for the mid- and higher-ranges of the tool, Black individuals have lower rates of new arrest and new filing than white or Hispanic individuals with the same score. At the lower end of both scales the confidence intervals overlap

Comparison of Racial Differences in Logistic Regression Curves—PSA, Los Angeles



The following table shows the results of a logistic regression which predicts each outcome of interest by the relevant PSA subscale risk score, race, and number of days spent released. This statistical test compares Black and Hispanic individuals with white individuals. Risk level on the relevant PSA subscale is in each case a statistically significant ($p < 0.001$) predictor of the outcome of interest. The number of days the individual was out on release also was a statistically significant predictor of all of the crime-related outcomes, but not the FTA outcome, indicating that the longer an individual spends on release the more likely the individual is to experience the new arrest, new filing, new conviction, or new violent arrest.

Additionally, Black race is a statistically significant predictor of outcome of interest for FTA, new arrest, new filing, and new violent arrest. For new arrest and new filing, Black race has a negative coefficient, indicating that Black individuals had a lower probability of those outcomes compared to white individuals with the same risk scores. For FTA and new violent arrest, Black race has a positive coefficient, indicating that Black individuals had a higher probability of FTA and new violent arrest compared to white individuals with the same risk scores.

Hispanic ethnicity is a statistically significant predictor of outcome of interest for FTA, new conviction, and new violent arrest. For FTA, new conviction, and new violent arrest, Hispanic ethnicity has a positive coefficient, indicating that Hispanic individuals had a higher probability of these outcomes compared to white individuals with the same risk scores.

This statistical test is limited, however, because it tests for an overall effect of race across the full risk scale, and as can be seen from the above charts there may be different patterns across particular ranges

of the tool subscales. The next table will use a more complex statistical model that allows for this possibility.

	<i>Dependent variable:</i>				
	FTA (1)	New Arrest (2)	New Filing (3)	New Conviction (4)	New Violent Arrest (5)
PSA FTA Risk Score	0.388*** (0.021)				
PSA NCA Risk Score		0.602*** (0.014)	0.453*** (0.016)	0.425*** (0.018)	
PSA NVCA Risk Score					1.154*** (0.077)
Race:Black	0.473*** (0.121)	-0.265*** (0.070)	-0.340*** (0.086)	-0.187 (0.100)	0.383*** (0.107)
Race:Hispanic	0.424*** (0.106)	0.053 (0.058)	-0.032 (0.069)	0.182* (0.080)	0.250** (0.094)
Days Released	0.001 (0.0005)	0.010*** (0.0003)	0.008*** (0.0004)	0.007*** (0.0004)	0.007*** (0.0004)
Constant	-4.326*** (0.138)	-3.656*** (0.084)	-4.175*** (0.103)	-4.554*** (0.119)	-3.621*** (0.104)
Observations	12,690	12,690	12,690	12,690	12,690
Log Likelihood	-3,113.844	-6,601.413	-4,820.922	-4,016.939	-3,528.170
Akaike Inf. Crit.	6,237.687	13,212.830	9,651.844	8,043.878	7,066.340

Note:

*p<0.05; **p<0.01; ***p<.001

The following table shows the results of a logistic regression which predicts each outcome of interest by the relevant PSA subscale risk score, race, the interaction between race and the PSA risk score, and number of days spent released. Risk score is a statistically significant predictor of each outcome of interest, as is the number of days released for all outcomes except FTA. This statistical test again compares Black and Hispanic individuals with white individuals.

The results indicate that there is no statistically significant interaction between Black race and the relevant PSA subscale risk scores on any of the outcomes of interest. There is, however, an interaction between Hispanic ethnicity and PSA NCA risk score on new arrest, indicating that the impact of Hispanic ethnicity on new arrest varies at different risk scores. The results indicate that Hispanic individuals have lower rates of new arrest at lower scores of the PSA NCA scale, but the rate of new arrest rises more sharply for Hispanic individuals compared to white individuals as the risk level increases. At the higher

end of the scale the rates of new arrest for Hispanic individuals are reversed, and Hispanics have higher rates of new arrests relative to white individuals with the same score.

	<i>Dependent variable:</i>				
	FTA (1)	New Arrest (2)	New Filing (3)	New Conviction (4)	New Violent Arrest (5)
PSA FTA Risk Score	0.391*** (0.058)				
PSA NCA Risk Score		0.566*** (0.031)	0.408*** (0.036)	0.376*** (0.043)	
PSA NVCA Risk Score					1.012*** (0.214)
Race:Black	0.470 (0.317)	-0.097 (0.174)	-0.461 (0.243)	-0.248 (0.284)	0.417*** (0.122)
Race:Hispanic	0.441 (0.278)	-0.217 (0.140)	-0.292 (0.185)	-0.120 (0.221)	0.193 (0.105)
Days Released	0.001 (0.0005)	0.010*** (0.0003)	0.008*** (0.0004)	0.007*** (0.0004)	0.007*** (0.0004)
FTA*Black	0.001 (0.074)				
FTA*Hispanic	-0.004 (0.064)				
NCA*Black		-0.040 (0.042)	0.030 (0.054)	0.015 (0.062)	
NCA*Hispanic		0.074* (0.035)	0.063 (0.042)	0.071 (0.049)	
NVCA*Black					-0.052 (0.256)
NVCA*Hispanic					0.278 (0.236)
Constant	-4.336*** (0.259)	-3.525*** (0.130)	-3.991*** (0.167)	-4.347*** (0.201)	-3.594*** (0.110)
Observations	12,690	12,690	12,690	12,690	12,690
Log Likelihood	-3,113.838	-6,594.954	-4,819.725	-4,015.562	-3,526.084
Akaike Inf. Crit.	6,241.676	13,203.910	9,653.450	8,045.125	7,066.167

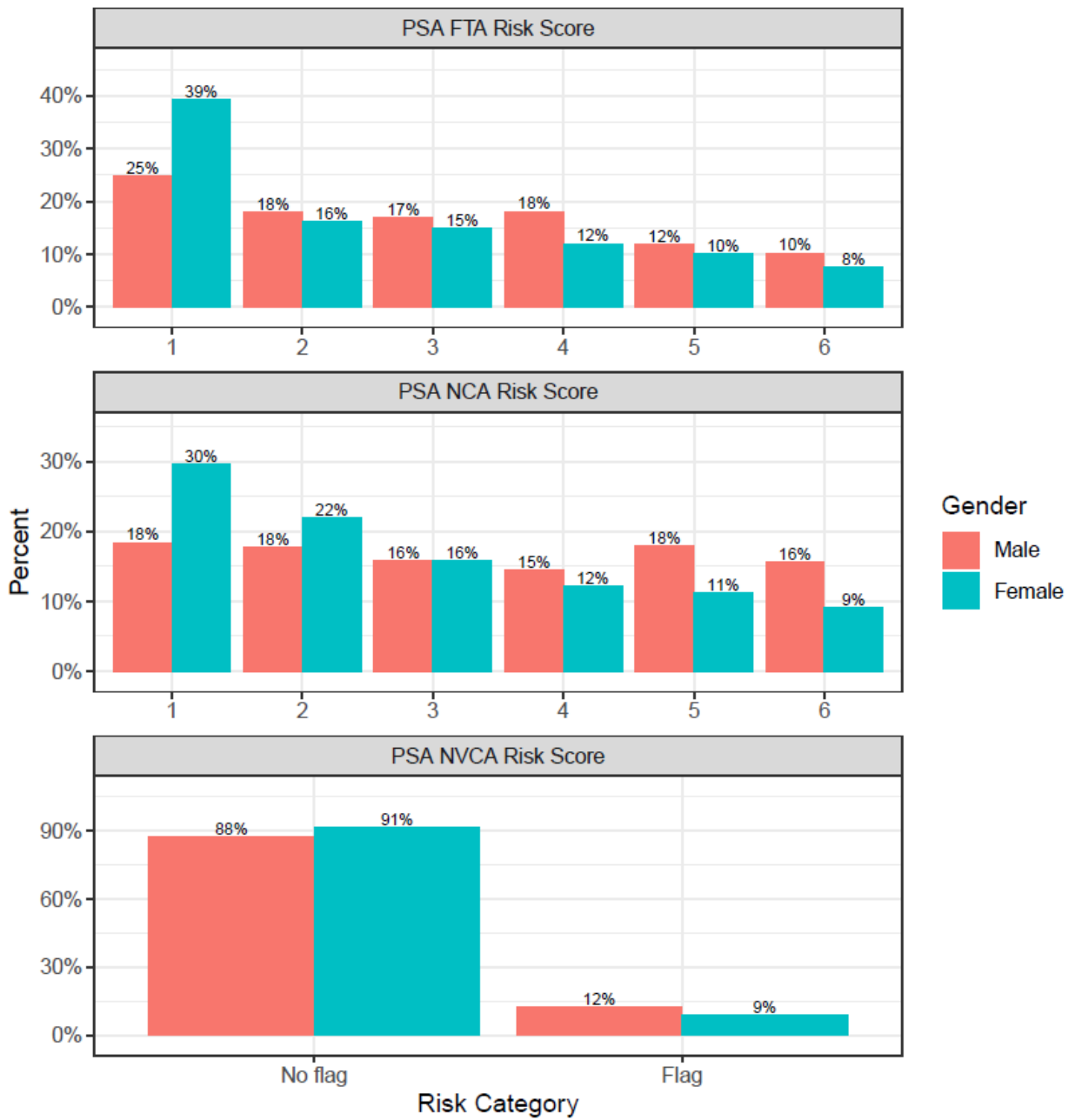
Note:

*p<0.05; **p<0.01; ***p<.001

GENDER

The following chart shows the distribution of risk assessment scores by gender. The distribution of risk scores for women is more concentrated in the lower risk scores compared to men.

Los Angeles Distribution of Assessments by PSA Risk Category



PSA FTA Risk Score	Male	Female	PSA NCA Risk Score	Male	Female
1	2,672	981	1	1,976	742
2	1,933	406	2	1,912	548
3	1,830	372	3	1,703	394
4	1,945	301	4	1,561	306
5	1,268	251	5	1,921	282
6	1,096	190	6	1,671	229

PSA NVCA Risk Score	Male	Female
No flag	9,403	2,283
Flag	1,341	218

The number of assessed individuals in each gender group is sufficient to run statistical tests that look at how the PSA tool scales performed by gender.

The following table shows the AUC values¹⁴ and 95% confidence intervals for each outcome of interest and relevant PSA risk subscale separately for women and men. With the exception of AUC values for new violent criminal activity which fall into the fair range, all other AUC values are in the good to excellent range. Statistical testing¹⁵ indicates that there is a statistically significant difference in AUC between women and men for the outcomes of new filing, new conviction, and new violent arrest. The results indicate that the PSA NCA subscale has a better ability to distinguish between individuals who are lower or higher risk for women than for men for the outcomes of new filing and new conviction. Similarly, the PSA violent flag has a better ability to distinguish between individuals who are lower or higher risk for women than for men for the outcome of new violent arrest.

Risk Score	Outcome	AUC		CI (95%)	
		Female	Male	Female	Male
PSA FTA	FTA	0.721	0.679	0.682-0.761	0.661-0.696
PSA NCA	New Arrest	0.762	0.747	0.741-0.783	0.738-0.756
PSA NCA	New Filing	0.747	0.699	0.718-0.777	0.687-0.712
PSA NCA	New Conviction	0.734	0.691	0.698-0.769	0.677-0.704
PSA NVCA	New Violent Arrest	0.626	0.570	0.59-0.663	0.556-0.584

^a N Female = 2501 , N Male = 10744

The following series of charts show the results of statistical models of the predictive power of the relevant PSA subscale for each outcome of interest for women as compared to men. Each line represents the probability of each outcome of interest at each risk level separately for each gender. The

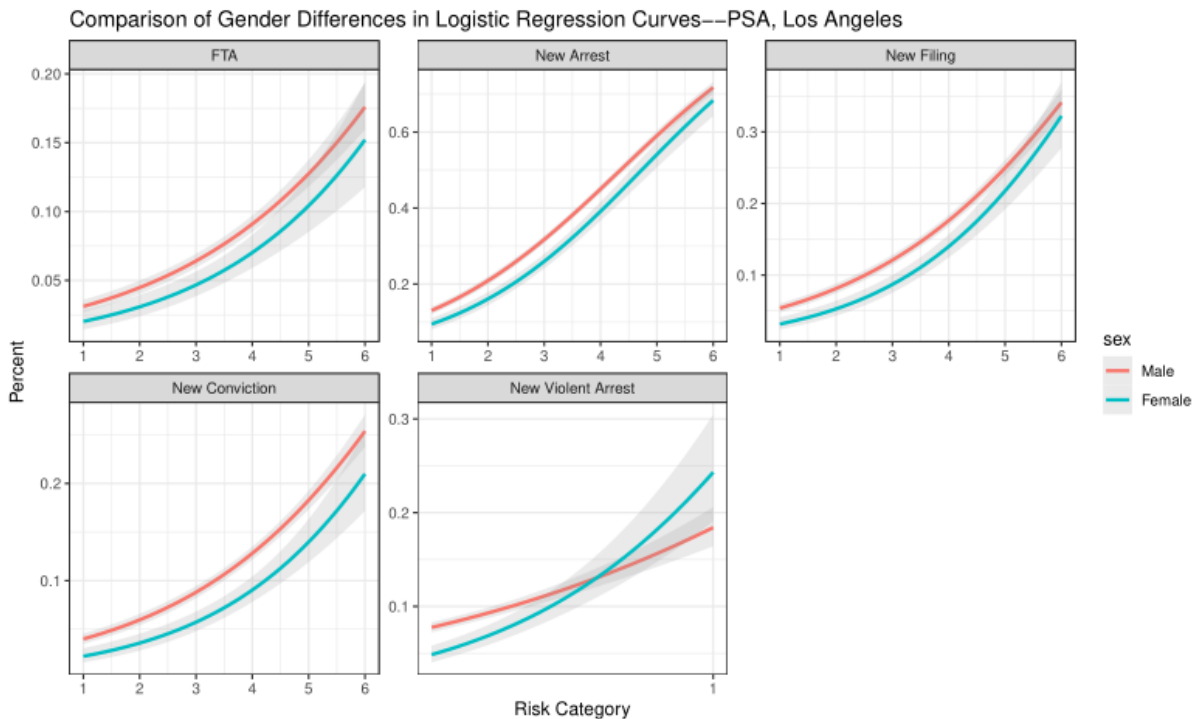
¹⁴ See p. 4 for description of the meaning of AUC values.

¹⁵ DeLong's test for two ROC curves

grey area around each line represents a 95% confidence interval – where the grey areas do not overlap the evidence indicates there is likely a true difference between the groups, where the grey areas overlap the evidence may not be strong enough to conclude that there are differences between them.

Because there are fewer women at the high end of the risk distributions, the 95% confidence intervals tend to be wider at the high end of the distributions for each outcome. Across the outcomes of FTA, new arrest, new filing, and new conviction, the rate of each of these outcomes is lower for women than for men with the same PSA FTA and PSA NCA risk scores. There is likely a true difference even though there is some overlap in confidence intervals, particularly at the high end of the range for new arrest, new filing, and new conviction, and at both the high and low ends of the range for FTA.

For new violent arrest, women show a lower rate of this outcome when the PSA NVCA subscale indicates no new violent flag. When the tool indicates a violent flag, however, women show a higher rate of new violent arrest, though the wide confidence interval indicates that given the rarity of a violent flag among women combined with the low rates of new violent arrest overall there may not be enough evidence to reliably indicate a true difference.



The following table shows the results of a logistic regression which predicts each outcome of interest by the relevant PSA subscale risk score, gender, and number of days spent released. This statistical test

compares women with the base group of men. Risk level on the relevant PSA subscale is in each case a statistically significant ($p < 0.001$) predictor of the outcome of interest. The number of days the individual was out on release was also a statistically significant predictor of all but the FTA outcome, indicating that the longer an individual spends on release the more likely the individual is to experience a new arrest, new filing, new conviction or new violent arrest.

Female gender is a statistically significant predictor of all of the outcomes of interest and the negative coefficient values indicate that for each outcome, women are statistically significantly less likely to experience the outcome of interest compared to men with the same risk score.

This statistical test is limited, however, because it tests for an overall effect of gender across the full risk scale, and as can be seen from the above charts there appear to be different patterns for women as compared to men especially for the new violent arrest outcome. The next table will use a more complex statistical model that allows for this possibility.

	<i>Dependent variable:</i>				
	FTA (1)	New Arrest (2)	New Filing (3)	New Conviction (4)	New Violent Arrest (5)
PSA FTA Risk Score	0.385*** (0.021)				
PSA NCA Risk Score		0.596*** (0.013)	0.449*** (0.016)	0.418*** (0.018)	
PSA NVCA Risk Score					1.175*** (0.075)
Female	-0.293** (0.100)	-0.256*** (0.057)	-0.281*** (0.075)	-0.397*** (0.087)	-0.273** (0.089)
Days Released	0.001 (0.0005)	0.010*** (0.0003)	0.008*** (0.0003)	0.007*** (0.0004)	0.007*** (0.0004)
Constant	-3.897*** (0.100)	-3.625*** (0.069)	-4.214*** (0.087)	-4.392*** (0.098)	-3.351*** (0.067)
Observations	13,245	13,245	13,245	13,245	13,245
Log Likelihood	-3,212.042	-6,846.348	-4,967.793	-4,143.774	-3,629.889
Akaike Inf. Crit.	6,432.084	13,700.700	9,943.586	8,295.548	7,267.779

Note:

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

The following table shows the results of a logistic regression which predicts each outcome of interest by the relevant PSA subscale risk score, gender, the interaction between gender and the PSA risk score, and number of days spent released. Risk score is a statistically significant predictor of each outcome of interest, and except in the case of the FTA outcome, the number of days spent released is also a

statistically significant predictor of the outcomes of interest. This statistical test again compares women with men as the base group.

The results indicate that there is not a statistically significant interaction between gender and risk score on FTA, new filing, new arrest, new filing and new conviction. For new violent arrest there is a statistically significant ($p < 0.001$) interaction between PSA NVCA risk score and gender. The results indicate that women have statistically significantly lower rates of new violent arrest compared to men when there is no new violent flag, but women have higher rates of new violent arrest when there is a violent flag.

	<i>Dependent variable:</i>				
	FTA (1)	New Arrest (2)	New Filing (3)	New Conviction (4)	New Violent Arrest (5)
PSA FTA Risk Score	0.377*** (0.023)				
PSA NCA Risk Score		0.593*** (0.015)	0.438*** (0.017)	0.410*** (0.020)	
PSA NVCA Risk Score					1.058*** (0.082)
Female	-0.491* (0.241)	-0.317* (0.134)	-0.574** (0.196)	-0.602** (0.230)	-0.459*** (0.106)
Days Released	0.001 (0.0005)	0.010*** (0.0003)	0.008*** (0.0003)	0.007*** (0.0004)	0.007*** (0.0004)
FTA*Female	0.053 (0.058)				
NCA*Female		0.018 (0.035)	0.074 (0.046)	0.052 (0.053)	
NVCA*Female					0.811*** (0.207)
Constant	-3.864*** (0.106)	-3.614*** (0.072)	-4.165*** (0.092)	-4.360*** (0.103)	-3.321*** (0.068)
Observations	13,245	13,245	13,245	13,245	13,245
Log Likelihood	-3,211.618	-6,846.218	-4,966.435	-4,143.294	-3,622.553
Akaike Inf. Crit.	6,433.235	13,702.440	9,942.871	8,296.587	7,255.106

Note:

* $p < 0.05$; ** $p < 0.01$; *** $p < .001$

Table 1. Public Safety Assessment (PSA): Factors and Weights

Risk Factor	Response	Weight
FAILURE TO APPEAR (0-7)		
Pending Charge at the Time of the Offense	No	0
	Yes	1
Prior Conviction	No	0
	Yes	1
Prior Failures to Appear Pretrial in Past 2 Years	0	0
	1	2
	2 or More	4
Prior Failure to Appear Pretrial Older than 2 Years	No	0
	Yes	1
NEW CRIMINAL ACTIVITY (0-13)		
Age at Current Arrest	23 or Older	0
	22 or Younger	2
Pending Charge at the Time of the Offense	No	0
	Yes	3
Prior Misdemeanor Conviction	No	0
	Yes	1
Prior Felony Conviction	No	0
	Yes	1
Prior Violent Conviction	0	0
	1 or 2	1
	3 or more	2
Prior Failure to Appear Pretrial in Past 2 Years	0	0
	1	1
	2 or More	2
Prior Sentence to Incarceration	No	0
	Yes	2
NEW VIOLENT CRIMINAL ACTIVITY (0-7)		
Current Violent Offense	No	0
	Yes	2
Current Violent Offense & 20 Years Old or Younger	No	0
	Yes	1
Pending Charge at the Time of the Offense	No	0
	Yes	1
Prior Conviction	No	0
	Yes	1

Prior Violent Conviction	0	0
	1 or 2	1
	3 or More	2

Source: [Public Safety Assessment: Risk Factors and Formula, Laura and John Arnold Foundation \(2013\)](#)

Table 2. Public Safety Assessment (PSA): Factors and Weights

Outcome Measure	Raw Score	Risk Scale
Failure to Appear (FTA)	0	1
	1	2
	2	3
	3	4
	4	4
	5	5
	6	5
	7	6
New Criminal Activity (NCA)	0	1
	1	2
	2	2
	3	3
	4	3
	5	4
	6	4
	7	5
	8	5
9-13	6	
Outcome Measure	Raw Score	NCVA Flag
New Violent Criminal Activity (NVCA)	0	No
	1	No
	2	No
	3	No
	4	Yes
	5	Yes
	6	Yes
	7	Yes

Source: [Public Safety Assessment: Risk Factors and Formula, Laura and John Arnold Foundation \(2013\)](#)

APPENDIX B

PSA Violent Offense List

PC CODE	Description
69	Obstructing or resisting exec officer in performance of duty; threats, force, or violence
136.1(c)(1)	Intimidating/Threat Witness/Victim and Act is accompanied by force
140(a)	Threatening Witnesses, victims or informants.
148(b)	Removal or taking of weapon other than firearm from peace officer during commission of resisting offense
148(c)	Removal or taking of firearm from peace officer during commission of resisting offense
148(d)	Removal or taking of weapon firearm from peace officer engaged in performance of duty
148.10(a)	Resist Po: Cause death/SBI
149	Assault by a public officer
151	Advocacy to kill or injure peace officer
186.26(c)	Use of coercion or violence to solicit or recruit another to actively participate in criminal street gang
187(a)	Murder first or second degree
191.5(a)	Gross vehicular manslaughter while intoxicated
192(a)	Voluntary manslaughter
192(b)	Involuntary manslaughter
192(c)(1)	Vehicular manslaughter with gross negligence
192(c)(3)	Vehicular manslaughter
192.5(a)	Vehicular manslaughter in the operation of a vessel while intoxicated
192.5(b)	Vehicular manslaughter in the operation of a vessel while intoxicated
192.5(c)	Vehicular manslaughter in the operation of a vessel
203	Mayhem
205	Aggravated Mayhem
206	Torture
207(a)	Kidnapping
207(b)	Kidnap -14 to com I&I
207(c)	Kidnapping by false pretense
207(d)	Kidnapping from outside the state
208(b)	Kidnap child under 14 yrs
209(a)	Kidnapping for ransom
209(b)(1)	Kidnap: commit rob/rape/etc
209.5(a)	Kidnap during carjacking
210.5	False imprisonment of a hostage
667.85	Kidnap to deprive parent
211	Robbery: first or second degree
212	Fear defined for robbery
212.5	Robbery; degrees

214	Train robbery
215	Carjacking
217.1(a)	Assault on a public official
217.1(b)	Attempted murder of a public official
218	Train wrecking; attempt; punishment.
218.1	Obstructing railroad track; punishment.
219	Train derailling or wrecking; punishment.
219.1	Throwing missile at common carrier with bodily harm
219.2	Throwing hard substance or shooting missile at train or other conveyance
220	Assault with intent to commit mayhem, rape, sodomy, oral copulation, or any violation of Section 264.1, 288, or 289
220(a)(1)	Assault with intent to commit a felony
220(a)(2)	Assault with intent to commit a felony-victim under 18
220(b)	Assault to commit a felony during the commission of a first degree burglary
222	Administering to another any chloroform, ether, laudanum, or any controlled substance, anesthetic, or intoxicating agent
236	False imprisonment
236.1	Human trafficking; provisions regarding minors; consideration of total circumstances
237(a)	False imprisonment
240	Assault
241	Assault
241.1	Assault on custodial officer
241.2	Assault on school or park property
241.3	Assault against person on public transportation, both on property of and within motor vehicle of provider
241.4	Assault on peace officer of a school district
241.5	Assault on a highway worker
241.6	Battery on school employee
241.7	Assault against jurors
241.8(a)	Battery against member of us armed forces
242	Battery
243	Battery
243.1	Battery on custodial officer
243.2(a)(1)	Battery on pers on school/park/grnds
243.25	Battery on an elder or dependent adult
243.3	Battery on transportation personnel/passenger
243.35	Battery on public transportation provider
243.4	Sexual battery
243.5(a)(1)	Assault or battery on school prop
243.6	Battery on school employee
243.65(a)	Battery against a highway worker
243.7	Battery against jurors

243.8(a)	Battery against a sports official
243.9(a)	Aggravated battery by gassing on peace officer or local detention facility employee
244	Aslt w/caustic chem/etc
244.5(b)	Assault with stun gun/taser
244.5(c)	Assault with stun gun or taser on peace officer or firefighter
245(a)(1)	Force/adw-not firearm: gbi
245(a)(2)	Aslt w/ firearm on person
245(a)(3)	Aslt w/machinegun on person
245(a)(4)	Force/adw not firearm: gbi
245(b)	Assault w/semiauto rifle
245(c)	Adw not f/arm: po/fire: gbi
245(d)(1)	Assault with a firearm upon a peace officer or firefighter
245(d)(2)	Assault on peaceofficer/firefighter with semiautomatic firearm
245(d)(3)	Machine gun/assault weapon on a peace officer/firefighter
245.2	Assault (adw/gbi) upon transportation personnel, mass transit personnel
245.3	Assault (adw/gbi) upon a custodial officer
245.5(a)	Adw/gbi schl emp: no f/arm
245.5(b)	Assault with firearm on a school employee
245.5(c)	Adw/stun gun or taser: school employee
245.6	Hazing resulting in death/serious bodily injury
246	Shoot: inhab dwell/veh/etc
246.3(a)	Firearm disch w/neg
246.3(b)	BB device disch w/ neg
261(a)	Rape
261.5(a)	Sex intercourse w/mnr -18
261.5(b)	Sex w/minor: + or - 3 yrs
261.5(c)	Sex w/minor:3+ yrs younger
261.5(d)	Sex w/minor: perp 21+ vic-16
262(a)(1)	Rape spouse by force/etc
262(a)(2)	Rape spouse und c/sub/etc
262(a)(3)	Rape: spouse uncon of act
262(a)(4)	Rape: spouse - threat to kidnap, inflict extreme pain, serious bodily injury
262(a)(5)	Rape: spouse - threat to incarcerate, arrest, deport
262(a)(6)	Rape of spouse by threat to arrest or deport
264.1	Rape/etc: cnrt force/viol
266a	Taking a person for prostitution
266b	Abduction to live in illicit relation; using force
266c	Unlawful sexual intercourse, sexual penetration, oral copulation, or sodomy; consent procured by false or fraudulent representation with intent to create fear
266h(b)	Pimping a minor
266i(b)	Pandering a minor
266j	Procurement of child under age 16 for lewd and lascivious acts
267	Abduction; person under 18 for purpose of prostitution

269(a)	Agg sex aslt: mn: frce/etc	
273.4	Female genital mutilation	
273.5(a)	Injuring a spouse, cohabitant, fiancé, boyfriend, girlfriend or child's parent	
273.5(f)	Inf crpl inj: sps/etc w/pr	
273.6(b)	Viol crt ord to prev domes viol – results in physical injury	
273.6(d)	Domestic violence w/prior – act of violence or a credible threat of violence	
273a(a)	Willful cruel to child/poss inj/death	
273a(b)	Willful cruelty to child	
273ab(a)	Assault of child under 8 by force likely to produce GBI resulting in death	
273ab(b)	Assault of child under 8 by force likely to produce GBI resulting in brain injury, paralysis	
273d(a)	Inflict injury upon child	
278	Child stealing	
285	Incest	
286(b)	Sodomy: person under 18	
286(c)	Sodomy: person under 14	
286(d)	Sodomy in concert w/force	
286(f)	Sodomy: vict uncons of act	
286(g)	Sodomy: vict incapbl:consent	
286(h)	Sodomy: vic/def in mntl inst	
286(i)	Sodomy: no ok: vict drugged	
286(j)	Sodomy by impersonation	
286(k)	Sodomy under color of authority	
288(a)	Lewd or lasciv acts/w/child und 14yrs	
288(b)	Lewd/lasc acts w/child under 14 or dependent person	
288(c)	Lewd/lasc act w/chld 14/15:def 10yr+ or dependent person	
288.2(a)	Harmful mtr sent w/int of seduc minor	
288.3	Contact with intent to commit sex act	
288.4	Arranging a meeting with minor for lewd purposes	
288.5(a)	Continuous sexual abuse of child	
288.7(a)	Sex/sodomy with a child under 10	
288.7(b)	Oral copulation/sexual penetration with a child under 10	
287(b)	Oral copulation w/pers und 18yrs	
287(c)	Oral copul w/person und 14/by force	
287(d)	Oral cop in concert: vic incap of con	
287(f)	Oral cop: vic uncon/asleep	
287(g)	Oral copulation of an incompetent person	
287(h)	Oral cop: vic/def in mntl inst	
287(i)	Oral copulation by anesthesia or controlled substance	
287(j)	Oral copulation by impersonation	
287(k)	Oral copulation under color of authority	
288a(b)	Oral copulation w/pers und 18yrs	
288a(c)	Oral copul w/person und 14/by force	

288a(d)	Oral cop in concert: vic incap of con
288a(f)	Oral cop: vic uncon/asleep
288a(g)	Oral copulation of an incompetent person
288a(h)	Oral cop: vic/def in mntl inst
288a(i)	Oral copulation by anesthesia or controlled substance
288a(j)	Oral copulation by impersonation
288a(k)	Oral copulation under color of authority
289	Sexual pen with force/etc
289.6(a)(3)	Sex: emp/etc cnf/detention fac
311.4(a)	Using Minors for Sex Acts
311.4(b)	Using Minors for Commercial Sex Acts
311.4(c)	Using Minors for Sex Acts
347(a)	Poisoning, willful poison/etc food/etc
368(b)	Cause harm/death elder dep adult
368(c)	Elder/dependent adult cruelty
368(f)	False imprison: elder/dep adult violence
404(a)	Rioting
417(a)	Exhibit firearm or deadly weapon other than gun. Drawing, exhibiting, or using firearm or deadly weapon; self defense; peace officers.
417(b)	Exhibit firearm. Drawing, exhibiting, or using a firearm
417(c)	Exhibit firearm in presence of p.o. Drawing, exhibiting, or using firearm or deadly weapon; self defense; peace officers.
417.3	Exhibit firearm pres beh occup
417.8	Exhibit firearm/etc: resist arrest
422.6(a)	Violate civil rights by force or threat
451(a)	Arson causing great bodily injury
451(b)	Arson: inhabited structure/property
451.1	Arson with added circumstances
451.5(a)	Aggravated arson
452(a)	Causing fire that causes gbi
452(b)	Causing fire of inhabited struc/prop
455	Arson attempts and acts preliminary or in furtherance
646.9(a)	Stalking
646.9(b)	Stalking/temp restraining order
647.6(a)(1)	Annoy/molest child under 18yrs
647.6(b)	Annoy/molest child/ill entry of bldg
647.6(c)	Annoy/etc child -18 w/prior
667.61(d)(2)	Felony sex offenses; victim kidnapped increasing risk of harm
667.61(d)(3)	Felony sex offenses; victim tortured
667.61(e)(1)	Felony sex offense; victim kidnapped
667.61(e)(2)	Felony sex offenses during commission of burglary
667.61(e)(4)	Felony sex offenses against more than one victim
667.61(e)(5)	Felony sex offenses -tying or binding of victim or another person
667.8	Kidnap to commit sex offense
667.85	Kidnap child under 14 yrs

674	Sex offense by daycare provider	
836.6(c)	Escape from custody by force or violence	
4500	Assault by a life prisoner	
4501	Assault by a state prisoner	
4501.1(a)	Aggravated battery	
4501.5	Battery on non-confined person by prisoner	
4503	Holding of hostages; offense	
4530(a)	Escape from custody by force and violence	
4532(a)(2)	Escape from alternative custody by force or violence by person booked on misdemeanor	
4532(b)(2)	Escape from alternative custody by force or violence by person booked on felony	
11413(a)	terrorism by explosion	
11413(b)	terrorism by explosion (specified places)	
11418(b)	weapons of mass destruction: use and damage to life	
11418(c)	weapons of mass destruction: use and damage to public natural resources	
11418(d)	weapons of mass destruction: creation of new pathogens	
18740	Use of destructive device and explosive to injure/destroy	
18745	Explosion with intent to murder	
18750	Explosion of destructive device causing bodily injury	
18755	Explosion causing death, mayhem, GBI	
26100(c)	Discharge of firearm at another person from motor vehicle	
18540(a)	Use of firearm to intimidate a voter	
664/187(a)	Attempted murder?	
664/211	Attempted robbery	
Veh Code 2800.3(a)	SBI caused by flight from peace officer	
Veh Code 2800.3(b)	Death caused by flight from peace officer	

All attempts (PC 664), conspiracy (PC 182), solicitation (PC 653f), and accessory (PC 31) only if before the act of any of the offenses identified here also meet the definition of a violent offense for purposes of administering the PSA.