4/5/2021

Validation of the Ohio Risk Assessment System Pretrial Assessment

Yolo County Probation Department

Bauman Consulting Group

411. W. Loveland Ave., Suite 201-B, Loveland, OH 45140
513-403-4490 • INFO@BAUMANCONSULTINGGROUP.COM
WWW.BAUMANCONSULTINGGROUP.COM

Report prepared by:

Bria Higgs, M.A.
Troy C. Payne, Ph.D.
Ashley Bauman, M.S., M.B.A.
Erin Stark, M.S.

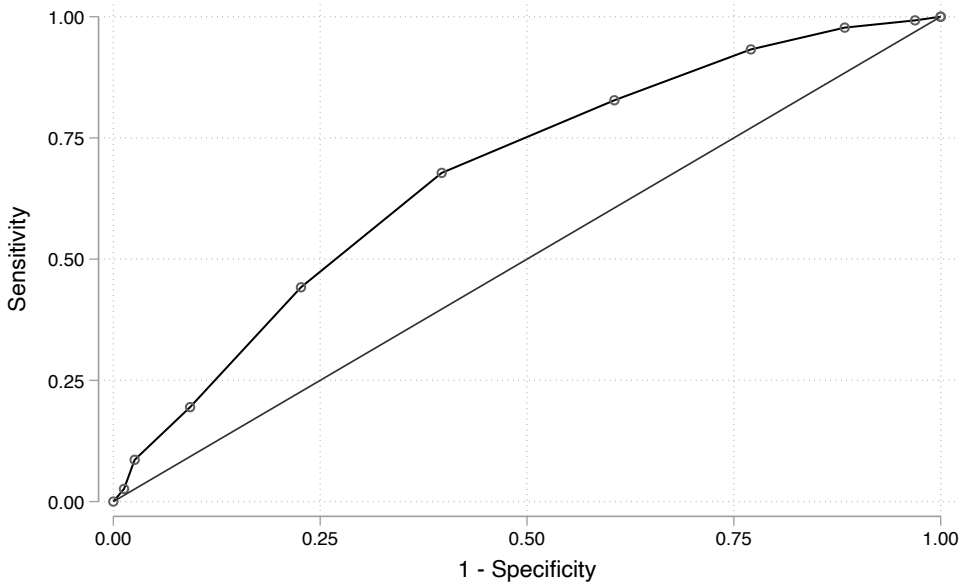
Executive Summary

In the past several decades, common practices in every facet of the criminal justice system are being re-examined by practitioners and other stakeholders. The subject of pretrial release, which refers to the freeing of an individual arrested on criminal charges before their charges are adjudicated on the condition that they return to court for hearings on their charges, is no different (Clarke, 1988). There are two broad categories of pretrial release – secured appearance bond and alternative release. There are also two goals of pretrial release policy. The first goal is to allow pretrial release whenever possible. The second goal is to minimize the risk to public safety that occurs when released defendants fail their pretrial release period. The introduction and continuous evaluation of pretrial assessments in criminal justice has since become a benchmark reform, often used to help probation officers and the courts make consistent, unbiased decisions while meeting the aforementioned goals of pretrial release.

In this study, the Ohio Risk Assessment System – Pretrial Assessment Tool (ORAS-PAT) will be validated specifically for use in Yolo County Department of Probation. It is important to validate assessment tools locally and to revalidate them periodically to assure that the predictive validity of the tool is as strong as possible. The ORAS can be used to determine failure risk, but it is not designed to determine what type of failure is likely. The tool's capacity for bias in the risk assessment tool or its application based on gender, race, ethnicity, age and crime type will also be evaluated.

The raw data provided to Bauman Consulting Group by Yolo County Department of Probation was processed and analyzed. There were six independent or predictor variables - race, gender, age, seriousness of the crime, risk level, and risk score. The dependent variable, also known as the outcome variable, was the base rate of pretrial release revocations. Descriptive statistics and crosstabulations of the base rate of bail revocations by each predictive variable were produced and then an Area Under the Curve - Receiving Operating Characteristic (ROC) analysis was conducted to evaluate the predictive accuracy of the risk assessment. The results of these tests showed that the tool produced no statistically significant biases based on race, gender, age, or most serious offense. The ORAS-PAT not only predicted equally well in light of each variable, it can also make valid risk predictions based on an individual's risk score or level.

Figure 1: Overall AUC-ROC



Area under ROC curve = 0.6734

Table of Contents

Background

Pretrial release is defined as the freeing of an individual arrested on criminal charges before their charges are adjudicated on the condition that they return to court for hearings on their charges as required by the court (Clarke, 1988). There are two broad categories of pretrial release – secured appearance bond and alternative release. Secured appearance bond refers to when an individual is released from custody on a promise to pay a certain bond amount if they fail to appear in court under the predetermined conditions set by the court upon release (Clarke, 1988). One may secure their bond with a deposit of the full bond amount in cash, a deposit of a portion of the bond amount in cash, a pledge or mortgage of the defendant's property, or by using a bondsman. An alternative release is a release that does not involve a secured bond of any kind. Release on recognizance (ROR) is a common type of alternative release determination. This typically requires the defendant to restrict their travel, associations, and other conduct related to the charges they were arrested on.

The first goal of pretrial release policy is to allow pretrial release whenever possible, thus avoid jailing a defendant during the period between his arrest and court disposition. The second goal is to minimize the risk to the public of defendants failing to appear and committing new crimes during their pre-trial release period. "Pretrial release and supervision agencies play a key role in the release decision-making process, acting as the "exchange service" between defendants and the criminal justice system (Hickert et al., 2013, 1). As a result, pretrial supervision professionals often report difficulties meeting competing goals such as increasing opportunities for release to protect individual's personal freedom and reduce jail populations, while also protecting public safety and lowering risk of pretrial failure (Hickert et al., 2013). Safety is of utmost concern to the public and to judges, who researchers have shown place far greater weight on the perceived dangerousness of the defendant than their likelihood of showing up for court when making pretrial release decisions. Research shows that defendants who are released pretrial tend to pose very little risk to public safety.

Six legal foundations are used to guide pretrial release and community supervision policies: a presumption of innocence, the right to counsel, the right to avoid self-incrimination, the right to due process of law, the right to equal protection under the law, and reasonable bail conditions (Hickert et al., 2013). Hickert and colleagues argue that the sixth foundation is the most central to the development and operation of pretrial supervision. Gromman and colleagues report that "defendants incarcerated pending trial are more likely to plead guilty, receive lengthier sentences, and subsequently recidivate more often in relation to defendants released prior to court disposition," (Grommon et al., 2019, 2). However, the literature has consistently shown that offering pretrial release with the least restrictive barriers has a positive impact on the justice-involved person's life course. Hickert and colleagues note that even when other factors such as the degree of charge, number of current charges, conviction history and

extra-legal variables are taken into consideration researchers still found that being detained pretrial was the strongest predictor of receiving incarceration as a sentence. Being detained pretrial was associated with over six times greater likelihood of receiving incarceration at sentencing. Being detained pretrial has also been shown to be significantly related to the length of incarceration sentence (Hickert et al., 2013, 1).

Risk Assessments

Pretrial risk assessments are among the principal instruments used to facilitate consistent and reliable decision-making. A risk assessment is a tool developed using evidence and feedback from probation and pretrial services officers. Risk assessments are meant to assist in determining a defendant's risk of failing to appear in court, incurring new criminal arrests, or committing technical violations that lead to the revocation of bail while on pretrial release. Risk assessments can also be used to guide decision-making when determining which interventions to assign to defendants. The significance of matching interventions to an defendant's risk level has been well documented and researchers have found that providing intensive supervision or services to low-risk defendants is ineffective and may worsen outcomes for these defendants (Hickert et al., 2013).

Risk assessments are designed and continually improved to prevent pretrial failure. Pretrial failure can be defined as the likelihood that a defendant will fail to appear in court (FTA) and/or commit a new offense during the pretrial period. A combination of legal factors, such as crime type and degree of offense, and personal risk factors such as criminal history, substance abuse, and pro-social ties to the community are used by pretrial agencies to determine a defendant's risk level and to determine the release criteria for a defendant (Hickert et al., 2013). However, practitioners that use risk assessments should note that pretrial risk assessments do not predict whether a specific defendant will fail, rather they provide a statistical probability of failure for defendants according to their risk score (Hickert et al., 2013, 2).

In the past several years there has been a national movement to further clarify and standardize both pretrial release supervision and risk assessments. As a result, validated evidence-based risk tools have been recommended for all jurisdictions and pretrial risk tools have been improved upon since their initial adaption for use in the criminal justice field over three decades ago. Many in the criminal justice field agree no pretrial risk assessment is universally applicable and that tools need to be modified and validated for each jurisdiction where the tool will be used (Hickert et al., 2013, 3). The Pretrial Justice institute recommends that risk assessments should also be revalidated on a regular basis to ensure that they continue to retain their predictive validity (Hickert et al., 2013, 3). Additionally, it is important to design, evaluate and implement assessment tools locally. For example, in a recent validation study of a proxy assessment that was first validated and used in Hawaii researchers found that the scores produced using Hawaii's assessment tool were not consistent predictors of recidivism for defendants being assessed in Salt Lake County (Hickert et al., 2013).

Risk Factors

As the literature base on the value and utilization of risk assessments grows several factors that are related to the likelihood of being released pretrial have been identified. Researchers also note that it is just as important to identify factors that are not predictive of future recidivism so that practitioners may eliminate them from consideration when making pretrial decisions. For example, Hickert and colleagues note that factors such as being a woman, being a person and property offender, and having no prior convictions or FTAs were significantly related to an increased likelihood of receiving a determination of ROR rather than receiving a determination of being released on bail. However, women and property offenders were more likely to fail to appear than their counterparts, which suggests that these defendants should be released on bail more often or that they should receive other stricter release conditions (Hickert et al., 2019). A similar study analyzed factors related to ROR determinations and found that perceived negative demeanor during the pretrial interview and belonging to a minority group reduced the likelihood of a recommendation to ROR. Another research team later found that "the primary factors that judges consider when deciding whether or not to release a defendant are: 1) the current offense, 2) the defendant's prior record, and 3) the defendant's current circumstances and character." Vaguely defined "extralegal factors such as the defendant's current circumstances, perceptible character, or demeanor introduce a large degree of subjectivity into the decision process that could easily lead to discriminatory release practices," (Hickert et al., 2019, 2). These findings demonstrate the importance of standardized pretrial risk instruments that reduce opportunities for subjective decision making.

In general, the literature shows that prior FTAs, prior convictions, current property offense, substance abuse, and younger age increase a person's likelihood of pretrial failure. Pretrial research has consistently found that people with current person and/or violent offense(s) are less likely to recidivate or miss court than other types of defendants. Although there has been some debate within the criminal justice field regarding which factors should be included on risk assessments, most studies indicate that static factors like age and criminal history are better predictors of pretrial risk than dynamic factors such as peer influence and employment status (Hickert et al., 2019).

Limitations of Risk Assessments

Although improvements have been made in the field, much of the variance in recidivism is still not accounted for with the risk tools that are currently available. The majority of the evidence for and against the value of pretrial risk assessment tools is based on theoretical claims "because research evaluations have not kept pace with the volume of local implementations," (Grommon et al. 2019, 2). Prediction of pretrial failure becomes more difficult as base rates of negative outcomes, such as FTA or revocation, deviate from 50%. The most common criticisms of risk assessment tools are about whether they "are able to predict pretrial misconduct, differentiate the likelihood or frequency of misconduct by risk level, and minimize the potential

effect of racial, ethnic, and gender biases while maintaining comparable rates or reducing the risk of pretrial misconduct," (Grommon et al. 2019, 2). Studies have been able to reliably predict the validity of specific tools, however, generalizations from these studies cannot be made about tools that have not been tested for validity, tools that have been created in one jurisdiction and implemented in another, "the items used to score tools, the capacity to administer the tools, how the perceptions of courtroom workgroup professionals can influence the adoption of tools" and the effect of using the tools on rates of incarceration and pretrial failure (Grommon et al. 2019, 2).

Pretrial risk assessments that are validated and implemented locally are most reliable because they are able to offer a standardized, objective, and testable method of decision-making. Yet even these tools are not foolproof. Many researchers and practitioners have noted the importance of allowing for professional discretion to override the determination of risk assessments when appropriate. Contemporary studies indicate that "when properly exercised, professional discretion can be used to prevent false positives or negatives," (Hickert et al., 2013, 3). Most in the criminal justice field agree that overrides of the tool based on professional discretion should be utilized infrequently and should be monitored regularly to ensure that defendants are not being punished in a biased manner. In cases where professional overrides are frequently needed it is advised that leadership in the pretrial workgroup note modifications that need to be made to the assessment (Hickert et al., 2013).

Methods

Current Study Context

Yolo County has established a Pretrial Release program through the Yolo County Probation Department to "help ensure equal, timely, and just administration of the laws governing pretrial release," (Yolo County). Probation officers collect information from justice-involved individuals that is relevant to the court's determination concerning pretrial release or detention. Conditions of release are determined for defendants that have not been recommended for ROR. Yolo County probation officers intend to provide the least restrictive supervised release conditions necessary to assure that the defendant will appear in court. Yolo County Pretrial services and courts also consider the safety of the community and take measures to protect the integrity of the judicial process while making supervision determinations.

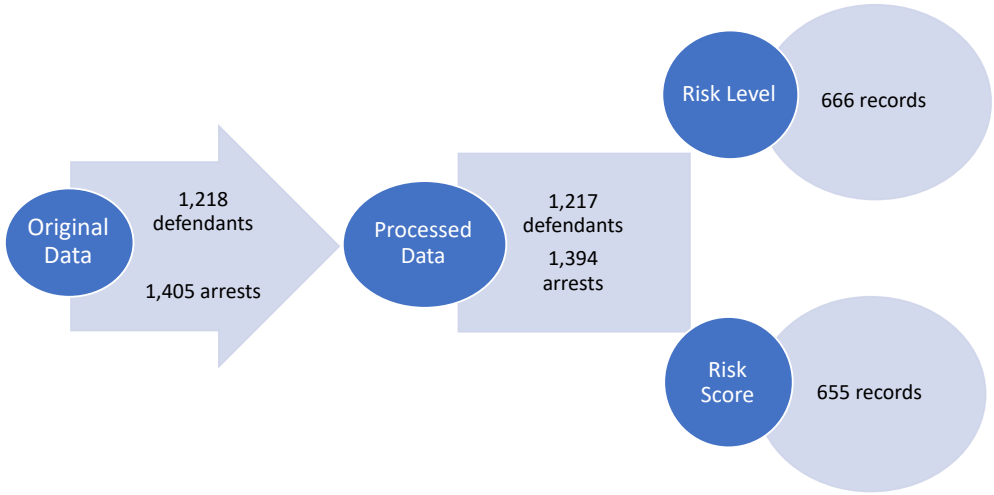
Using risk assessments to minimize an defendant's risk of pretrial failure is a growing practice in criminal justice. Given the heterogeneity of jurisdictions around the country and previously stated limitations of pretrial risk assessments Yolo County Pretrial Services partnered with Bauman Consulting Group to analyze their pretrial data and validate their pretrial risk

assessment tool. This validation of the Ohio Risk Assessment System – Pretrial Assessment Tool (ORAS-PAT) was conducted to ensure that the tool creates valid and reliable scores and to ensure that the score does not create any biases in treatment based on race, age, gender, or the type of crime the defendant is charged with. For further review the ORAS-PAT is included in the Appendix.

Sample

Yolo County Pretrial Services provided Bauman Consulting Group with four years of data in separate Excel workbooks. These workbooks included information for clients who successfully completed their pretrial terms and for clients who failed their pretrial term. The four Excel workbooks were then compiled into a single file containing 1,218 defendants in 1,405 arrests. Cases with duplicate values on charges, identification, and begin or end dates were removed. Pretrial services also provided Bauman Consulting Group with ORAS-PAT scores and risk levels for those clients who had been assessed during those time frames. Some clients were ordered directly to supervision, and thus an assessment was not conducted. ORAS-PTAS interviews, which were conducted by pretrial services officers in order to complete the risk assessments were not provided. As a result, individual items on the assessment were not analyzed as part of this validation. All in all, the final data set included 1,217 defendants in 1,394 arrests. Of all the defendants, 666 of them were assigned a risk level of low, medium, or high while 655 of them were assigned a numerical risk score ranging from 0-9 with a score of 0 being the lowest score and a score of 9 being the highest score.

Figure 2: Sample Flow Chart



The independent variables, also known as predictor variables, were race, gender, age, seriousness of the crime, risk level and risk score. The seriousness of a crime was gauged using the following hierarchy:

Table 1: Hierarchy for Crime Type

1	Murder
2	Sex offense
3	Arson
4	Robbery
5	Assault
6	Child Endangerment
7	Domestic Violence
8	Burglary
9	Firearm offenses
10	Drugs
11	Theft
12	DUI
13	Vehicle /traffic offenses other than DUI
14	Other

The dependent variable, also known as the outcome variable, was the base rate of defendants failing their pretrial release period which was operationalized as defendants having their pretrial release revoked.

Results

Descriptives

Once the data was processed and finalized, it was analyzed. First, univariate descriptive statistics on each predictor variable in the study were generated. Then, crosstabulations of base revocation rates by each independent variable were created. As shown in Table 2, defendants in this dataset were predominantly white and male.

Table 2: Frequency of Defendants by Race

Race	Frequency	Percent
Black	215	15.4
Hispanic	466	33.4
Other	85	6.1
White	628	45.0
Total	1,394	100.0

Table 3: Frequency of Defendants by Gender

Gender	Frequency	Percent
Female	377	27.0
Male	1,015	72.8
Other	2	0.14
Total	1,394	100.0

Table 4 shows that the largest age group in the sample is 25-34 year old's, who represent nearly 40% of the sample. The next largest groups in descending order are 35-44 year old's, 18-24 year old's, and 44-54 year old's. Defendants who are 55 and over as well as defendants under the age of 18 make up less than 10% of the overall sample. The mean age of defendants in the sample was 34.7 years while the median age was 32 years. Table 5 demonstrates that felonies were the most common crime type, representing over 87% of the defendants in the sample. Misdemeanors were less common, representing approximately 12% of the sample.

Table 4: Frequency of Defendants by Age

Age	Frequency	Percent
Under 18	3	0.2
18-24	286	20.5
25-34	514	36.9
35-44	300	21.6
45-54	180	12.9
55-64	94	6.7
65 and over	16	1.2
Missing	1	0.1
Total	1,394	100.0

Table 5: Frequency of Defendants by Crime Seriousness

Seriousness	Frequency	Percent
Misdemeanor	171	12.3
Felony	1,218	87.3
Missing	5	0.4
Total	1,394	100.0

Frequency tables for the last two variables convey that medium risk was the most common determination in the sample, with approximately 25% receiving a risk level of medium. When examining the individual risk scores, it was determined that 9 was the least common score and 5 was the most common score.

Table 6: Frequency of Defendants by Risk Level

Level risk	Frequency	Percent
Low	112	8.0
Medium	350	25.1
High	204	14.6
Missing	728	52.2
Total	1,394	100.0

Table 7: Frequency of Defendants by Score

Score	Frequency	Percent
0	14	1.0
1	37	2.7
2	56	4.0
3	92	6.6
4	121	8.7
5	129	9.3
6	118	8.5
7	55	3.9
8	21	1.5
9	12	0.9
Missing	739	53.1
Total	1,395	100.0

In addition to ensuring that the ORAS-PAT was predicting accurately, Yolo County also wanted to examine how the tool performed when examining results by race. They wanted to ensure that any tool that they were using did not exhibit any racial bias. The following tables convey an initial assessment of whether bias exists in the ORAS-PAT. Nearly 41% of all defendants on pretrial supervision by Yolo County receive bail revocations. The base revocation rates for Black, Hispanic, Other, and White are 42.33%, 40.47%, 31.76%, and 41.88% respectively. The base revocation rates for men and women is similar as well, with 41.44% of male defendants receiving revocations and nearly 39% of women receiving revocations. Thus, the ORAS-PAT demonstrates no significant differences when examined by race or by gender.

Table 8: Percent Bail Revoked by Race

Race	Percent revoked
Black	42.33%
Hispanic	40.47%
Other	31.76%
White	41.88%
Total	40.86%

Notes: The base rate revocation rate for the total sample is 40.9%

Table 9: Percent Revoked by Risk and Race

Race	Low	Med	Hi	No Risk Level	Any Risk Score
Black	14.3%	38.2%	62.5%	44.0%	40.6%
Hispanic	15.7%	42.1%	63.5%	40.2%	41.0%
Other	25.0%	27.3%	53.3%	27.3%	36.6%
White	20.9%	35.3%	54.0%	43.6%	40.1%

Table 10: Percent Revoked by Gender

Gender	Percent Revoked
Female	38.99%
Male	41.44%
Other	100.00%
Total	40.86%

Table 11: Percent Revoked by Risk and Gender

Gender	Low	Med	Hi	No Risk Level	Any Risk Score
Female	17.9%	39.6%	47.0%	39.0%	39.0%
Male	17.9%	36.4%	62.3%	42.1%	40.8%
Other				100.0%	

Note: Blanks mean there were zero persons in that category

When stratified by age, the data shows that defendants under 18 years old have their bail revoked most often (67%). Defendants aged 18-34 years old have their bail revoked at the next highest rates, which is roughly 43%. Revocations begin to taper off as defendants get older with 35-44 year old's receiving revocation at about 41%, 45-54 year old's receiving revocation at 35%, 55-64 year old's receiving revocation at about 34%, and people 65 and over receiving revocation at a rate of 25%.

Table 12: Percent Revoked by Age

Age	Percent Revoked
Under 18	66.67%
18-24	43.01%
25-34	43.39%
35-44	40.86%
45-54	35.00%
55-64	34.04%
65 and over	25.00%
Total	40.89%

Table 13: Percent Revoked by Risk and Age

Age	Low	Med	Hi	No Risk Level	Any Risk Score
18-24	13.0%	35.0%	72.7%	46.9%	39.7%
25-34	13.2%	41.7%	64.4%	41.6%	45.2%
35-44	21.7%	43.3%	43.5%	42.1%	39.5%
45-54	20.0%	26.8%	38.5%	39.8%	29.3%
55-64	33.3%	23.5%	58.3%	32.1%	36.6%
65 and over	0.0%	40.0%		20.0%	33.3%
Under 18					66.7%

Tables 14 and 15 shows that defendants who have been determined to demonstrate a higher risk receive revocations more often. Over 57% of defendants with a "high" risk level have their bail revoked while only 37% of defendants with a medium risk level and about 18% of defendants with a low risk level have their bail revoked. Similarly, as shown in Figure 2, over three quarters of defendants with a risk score of 8 (the second highest risk score) have their bail revoked. Conversely, smaller percentages of defendants with lower risk scores receive revocations. Only defendants with scores of 6, 7, 8 and 9 received revocations at a rate of over 50%. The overall trend is also best observed in Figure 3. The chart shows a line trending upward, conveying that as defendants' risk scores increase more of them receive bail revocations.

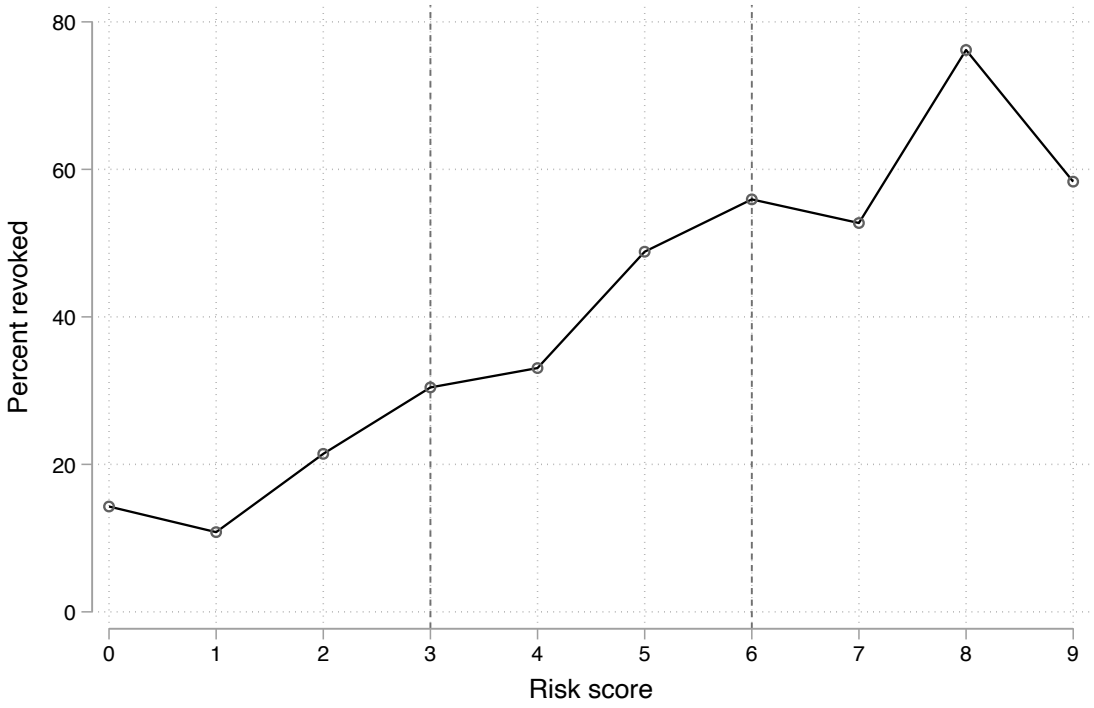
Table 14: Percent Revoked by Risk Level

Risk Level	Percent Revoked
Low	17.86%
Medium	37.43%
High	57.35%
No Score	41.50%

Table 15: Percent Revoked by Risk Score

Score	Percent Revoked
0	14.29%
1	10.81%
2	21.43%
3	30.43%
4	33.06%
5	48.84%
6	55.93%
7	52.73%
8	76.19%
9	58.33%
No score	41.00%

Figure 3: Percent Revoked by Risk Score



This data was also used to examine what percent of clients at each risk level failed. Unsurprisingly, our analysis showed that defendants who we classified as low risk failed their pretrial period least often. As can be seen in Table 16, approximately 4% of defendants who had their bail revoked failed due to failing to appear on their scheduled court date, 5.4% failed due to being arrested for a new crime, and 6.2% failed due to PTR. Among defendants who were classified as medium risk, about 12.6% failed their pretrial period due to failing to appear in court, 8.6% failed their period due to being arrested for a new crime, and 14% failed due to PTR. Lastly, the defendants who were classified as high risk, had the worst outcomes on pretrial supervision. Nearly 17% of defendants failed their pretrial period due to failing to appear in court, 12.3% failed their pretrial period due to being arrested for a new crime and nearly a quarter failed due to PTR.

Table 16: Risk Level by Pretrial Failure Type

Risk Level	FTA	NCO	PTR
Low	3.6%	5.4%	6.2%
Medium	12.6%	8.6%	14.0%
High	16.7%	12.3%	24.0%

Table 17 shows the breakdown of how the offenses were categorized. It also shows the percent revoked for each offense by risk level. There is no statistically significant relationship between offense type and bail revocation.

Table 17: Percent Revocations by Crime Type and Risk Score

Crime Type	Low	Med	Hi	No Score	Total by Most Serious Offense
Arson	0.0%	100.0%	0.0%	75.0%	44.4%
Assault	7.1%	29.4%	71.4%	46.7%	40.0%
Burglary	40.0%	51.2%	67.4%	62.9%	59.8%
Child Endangerment	17.1%	27.5%	10.0%	26.9%	23.6%
DUI	11.1%	28.6%	0.0%	19.9%	19.5%
Domestic Violence	-	16.7%	100.0%	41.2%	37.5%
Drugs	20.0%	39.5%	56.0%	48.9%	47.8%
Firearm	0.0%	12.5%	40.0%	22.7%	19.6%
Murder	0.0%	100.0%	-	0.0%	33.3%
Other	16.7%	50.0%	80.0%	50.0%	51.2%
Robbery	20.0%	10.0%	40.0%	60.0%	44.0%
Sex Offense	0.0%	0.0%	-	36.8%	28.0%
Theft	26.7%	42.4%	62.5%	48.2%	47.6%
Vehicle	20.0%	80.0%	-	40.0%	45.0%
Total by risk level	17.9%	37.4%	57.4%	41.5%	40.9%

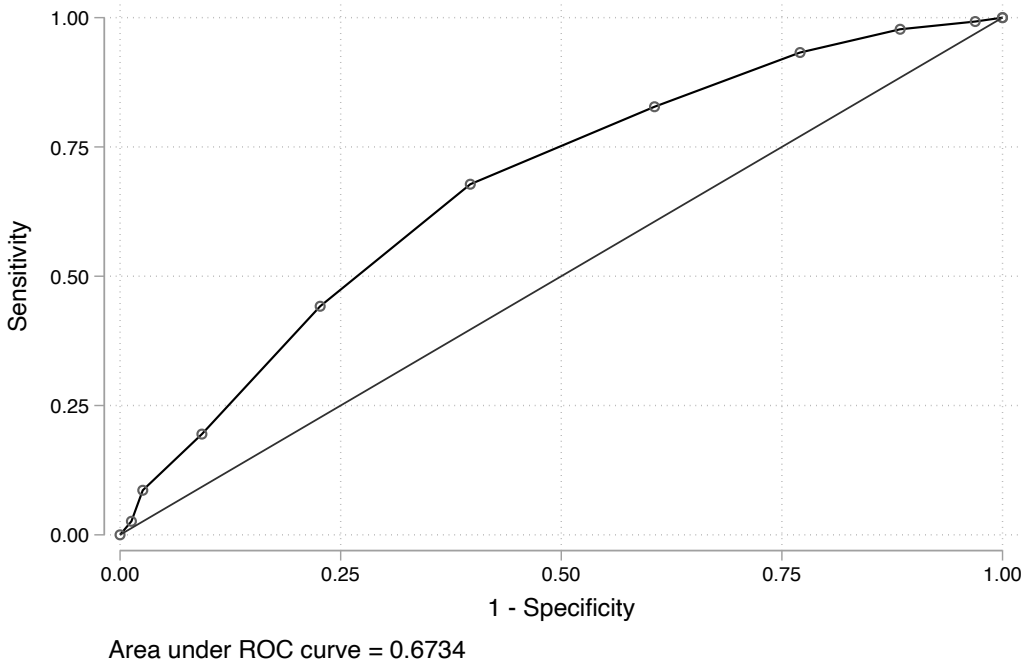
AUC-ROC Analyses

Once descriptive statistics were produced, significant associations were tested using a chi-squared test of independence. To examine the predictive validity of Yolo County's assessments we examined the Area Under the Curve (AUC) of the Receiving Operating Characteristic (ROC) curve statistics. This analysis is often used to evaluate the predictive accuracy of risk assessments tools in criminal justice (Alaska Justice Information Center, 2019). The points on a nonparametric ROC curve are created using individual scores from each risk assessment and are then conveyed on a graphical plot. The sensitivity, known as the true positive rate, and the specificity, known as the false positive rate, are then computed. Later these points are connected, and the area under the resulting curve is calculated (Alaska Justice Information Center, 2019). AUC values range from .50 to 1, where .50 suggests slim levels of classification and 1 indicates perfect classification. According to Grommon and colleagues, "AUC values below .54 are typically considered poor, .55 to .63 fair, .64 to .70 good, and .71 and above are excellent" (Grommon et al., 2019). These designations are widely considered to standard in criminal justice evaluations and "have been documented in reports adopted by the Bureau of Justice Assistance, National Institute of Justice, and National Institute of Corrections and

represent the benchmarks for predictive accuracy in the field of risk assessment," (Grommon et al., 2019, 6).

Overall, the AUC shows that there were no statistically significant differences in ROC by race, gender, age, or most serious offense. It also showed that the ORAS-PAT predicted equally well across all categories of our independent variables. AUC analyses were also conducted for each predictor variable on its own and results remained consistent in these analyses as well. The graph for the overall and individual analyses can be found in the Appendix.

Figure 3: Overall AUC-ROC



Though the ORAS-PAT was not designed to predict each of FTA, new crimes, and technical violations *separate* from the other failures, the research team examined the extent to which the ORAS-PAT could be used to predict specific kinds of pretrial failure using the current data. Conducting AUC-ROC analyses on each failure type is not appropriate in this context, but FTA received a score of 0.5895, new crime arrests received a score of 0.6138, technical violations received a score of 0.6476, and any revocation reason received a score of 0.6734. As noted above, AUC scores of 0 indicate that the risk assessment is a completely inaccurate classifier and AUC scores of 1 means that the risk assessment is thoroughly accurate. AUC values that exceed 0.60 are considered sufficient for risk assessments. In Yolo County's data, 53% of revocations in Yolo's data were technical violations, for reasons including non-compliance, GPS non-compliance, and SCRAM (Secured Continuous Remote Alcohol Monitor) non-compliance. The remaining revocations were slightly more likely to be for FTA (27%) than for new crimes (21%). Thus, at this time it is fair to conclude that the ORAS-PAT can be used to determine failure risk, but it is not designed to determine what type of failure is likely.

Table 18: AUC Scores on Pretrial Failure Types

Pretrial failure type	AUC Scores
Failure to appear	0.5895
New crime	0.6138
Technical violation	0.6476
Any failure	0.6734

Note: Values sum to more than 100% due to a small number of persons revoked for multiple reasons.

Though it would be useful to be able to compare the pretrial revocation rates for Yolo County defendants, it appears there are no published national average for base revocation rates due to many regional and local variances in criminal offending and adjudication. Bauman Consulting Group conducted an extensive literature search on published pretrial tool validations to develop a consensus on the broad range of available information. The research team found that the original ORAS Validation Study had an 83.8% rate of pretrial failure, including new crime and FTAs. The base pretrial revocation rate among Yolo County defendants who were released during their pretrial period is 41.5%. There are observable regional similarities – Alaska's statewide department of probation had a 41.5% pretrial failure rate in 2018. Female defendants in Salt Lake County, Utah had a 52% pretrial failure rate in 2019. Conversely, defendants in Kentucky's state parole and probation division had a 14% failure rate and defendants across 6 counties in Florida had a 13% failure rate in 2012.

Trends are similarly sporadic and difficult to compare when you examine types of pretrial failure. In 2013, 49% of defendants in Salt Lake County received a pretrial failure. Of these defendants, 46% failed due to FTA and 15% failed due to being arrested for a new crime. From 2000-2004, the total number of defendants who failed their pretrial period in Hennepin County, Minnesota were not reported. However, 26% of the defendants who failed the pretrial period failed to appear to court and 9.5% were arrested for new crimes. Much like Hennepin County, Minnesota, Santa Clara, California did not report their total number of defendants who failed the pretrial period but from January 2011-May 2011, 21% of defendants who failed their pretrial period received technical violations, 10.7% failed to appear to court, and 6.9% were arrested for new crimes. In Multnomah County, Oregon a total of 30% of defendants failed their pretrial period in 2009. Among those who failed 11% received technical violations, 5% were arrested for new crimes and 14% failed to appear to court.

It is difficult to compare Yolo County's results with that of the other agencies listed above for several reasons. First, there are a broad array of pretrial risk assessment tools being used in these studies – not all are using the ORAS. There are also a variety of time frames represented which can be influenced by the policy and legislation in place at the time. There are a variety of locations represented which can be influenced by policy, legislation, and culture. The sample sizes vary in each study which can influence the results. The samples themselves also vary in composition as it pertains to risk level, offense, race, gender, and other such predictor

variables. The time frame from release to case resolution and the resources made available to defendants in each sample varies as well across studies. With this in mind, the available data and anecdotal evidence suggests a common threshold of about 50% with anything below 50% often regarded as acceptable outcomes.

Conclusion

According to Mamalian, the purpose of a pretrial risk assessment is to predict the likelihood that defendants released prior to their trial will not appear for court and/or will commit a new offense during the pretrial period (2011). As the national movement to improve pretrial release supervision and risk assessments has taken hold, pretrial risk tools have become more reliable and precise. Given the heterogeneity of jurisdictions around the country and previously stated limitations of pretrial risk assessments experts recommend validating pretrial assessments locally (Hickert et al. 2013). Bauman Consulting Group conducted the current validation of the ORAS-PAT being used by Yolo County Pretrial Services to ensure that the tool creates valid and reliable scores and to ensure that the assessment does not create any biases in treatment based on race, age, gender, or the type of crime the defendant is charged with. The results of this study showed that the ORAS-PAT can make valid risk predictions based on an individual's risk score or level. Furthermore, no statistically significant bias was found based on race, gender, age, nor crime type. In closing, it is recommended that practitioners should test the validity of the tests regularly (Hickert, 2013) (Grommon et al., 2019). While the tool was found to be unbiased, practitioners should also remain cognizant of “how the perceptions of courtroom workgroup professionals can influence the” implementation of these tools,” (Grommon et al., 2019).

Appendices

Appendix I: Data description

Yolo County Probation provided four years of data in separate Excel workbooks. These workbooks included information for clients who successfully completed their terms and for clients who were revoked.

We combined these into a single file with 1,218 defendants in 1,405 arrests. After removing duplicates on charges, ID, and begin/end dates, we were left with 1,217 defendants in 1,394 arrests. Approximately half of those records, 666 had a risk level (low/medium/high), with 655 having a numerical risk score.

We defined the most serious offense using this hierarchy:

After removing duplicates on charges, ID, and begin/end dates, we were left with 1,217 defendants in 1,394 arrests. Approximately half of those records, 666 had a risk level (low/medium/high), with 655 having a numerical risk score.

Figure 2: Sample Flow Chart

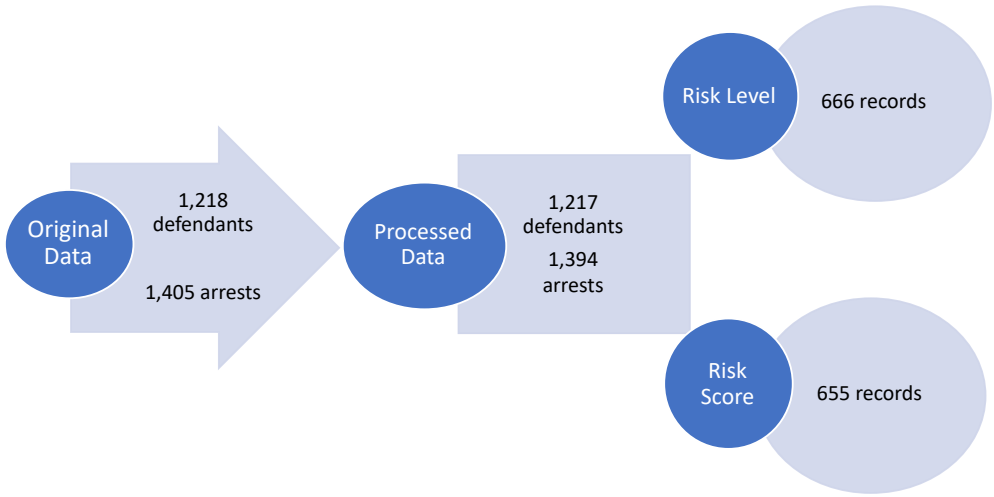


Table 1: Hierarchy for Crime Type

1	Murder
2	Sex offense
3	Arson
4	Robbery
5	Assault
6	Child Endangerment
7	Domestic Violence
8	Burglary
9	Firearm offenses
10	Drugs
11	Theft
12	DUI
13	Vehicle /traffic offenses other than DUI
14	Other

Appendix II: Univariate Descriptives

Table 2: Frequency of Defendants by Race

Race	Frequency	Percent
Black	215	15.4
Hispanic	466	33.4
Other	85	6.1
White	628	45.0
Total	1,394	100.0

Table 3: Frequency of Defendants by Gender

Gender	Frequency	Percent
Female	377	27.0
Male	1,015	72.8
Other	2	0.14
Total	1,394	100.0

Table 4: Frequency of Defendants by Age

Age	Frequency	Percent
Under 18	3	0.2
18-24	286	20.5
25-34	514	36.9
35-44	300	21.6
45-54	180	12.9
55-64	94	6.7
65 and over	16	1.2
Missing	1	0.1
Total	1,394	100.0

Table 5: Frequency of Defendants by Crime Seriousness

Seriousness	Frequency	Percent
Misdemeanor	171	12.3
Felony	1,218	87.3
Missing	5	0.4
Total	1,394	100.0

Table 6: Frequency of Defendants by Risk Level

Level risk	Frequency	Percent
Low	112	8.0
Medium	350	25.1
High	204	14.6
Missing	728	52.2
Total	1,394	100.0

Table 7: Frequency of Defendants by Score

Score	Frequency	Percent
0	14	1.0
1	37	2.7
2	56	4.0
3	92	6.6
4	121	8.7
5	129	9.3
6	118	8.5
7	55	3.9
8	21	1.5
9	12	0.9
Missing	739	53.1
Total	1,395	100.0

Appendix III: Base revocation rates

Table 8: Percent Bail Revoked by Race

Race	Percent revoked
Black	42.33%
Hispanic	40.47%
Other	31.76%
White	41.88%
Total	40.86%

Notes: The base rate revocation rate for the total sample is 40.9%

Table 10: Percent Revoked by Gender

Gender	Percent Revoked
Female	38.99%
Male	41.44%
Other	100.00%
Total	40.86%

Table 12: Percent Revoked by Age

Age	Percent Revoked
Under 18	66.67%
18-24	43.01%
25-34	43.39%
35-44	40.86%
45-54	35.00%
55-64	34.04%
65 and over	25.00%
Total	40.89%

Table 14: Percent Revoked by Risk Level

Risk Level	Percent Revoked
Low	17.86%
Medium	37.43%
High	57.35%
No Score	41.50%

Table 15: Percent Revoked by Risk Score

Score	Percent Revoked
0	14.29%
1	10.81%
2	21.43%
3	30.43%
4	33.06%
5	48.84%
6	55.93%
7	52.73%
8	76.19%
9	58.33%
No score	41.00%

Figure 3: Percent Revoked by Risk Score

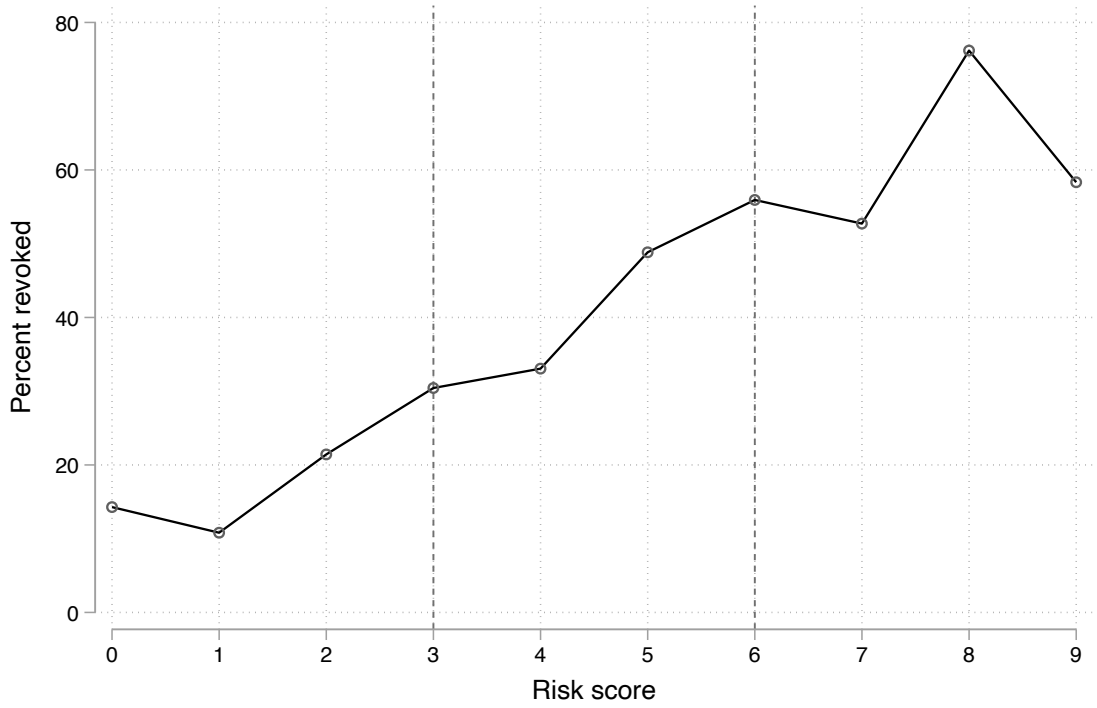


Table 17: Percent Revocations by Crime Type and Risk Score

Crime Type	Low	Med	Hi	No Score	Total by Most Serious Offense
Arson	0.0%	100.0%	0.0%	75.0%	44.4%
Assault	7.1%	29.4%	71.4%	46.7%	40.0%
Burglary	40.0%	51.2%	67.4%	62.9%	59.8%
Child Endangerment	17.1%	27.5%	10.0%	26.9%	23.6%
DUI	11.1%	28.6%	0.0%	19.9%	19.5%
Domestic Violence	-	16.7%	100.0%	41.2%	37.5%
Drugs	20.0%	39.5%	56.0%	48.9%	47.8%
Firearm	0.0%	12.5%	40.0%	22.7%	19.6%
Murder	0.0%	100.0%	-	0.0%	33.3%
Other	16.7%	50.0%	80.0%	50.0%	51.2%
Robbery	20.0%	10.0%	40.0%	60.0%	44.0%
Sex Offense	0.0%	0.0%	-	36.8%	28.0%
Theft	26.7%	42.4%	62.5%	48.2%	47.6%
Vehicle	20.0%	80.0%	-	40.0%	45.0%
Total by risk level	17.9%	37.4%	57.4%	41.5%	40.9%

Appendix IV: Percent Revocations by Risk and Demographic Variables

The tables below differ from the previous tables because they include the 'Any risk score' column which includes any defendant who had a risk score into the same category.

Table 9: Percent Revoked by Risk and Race

Race	Low	Med	Hi	No Risk Level	Any Risk Score
Black	14.3%	38.2%	62.5%	44.0%	40.6%
Hispanic	15.7%	42.1%	63.5%	40.2%	41.0%
Other	25.0%	27.3%	53.3%	27.3%	36.6%
White	20.9%	35.3%	54.0%	43.6%	40.1%

Table 11: Percent Revoked by Risk and Gender

Gender	Low	Med	Hi	No Risk Level	Any Risk Score
Female	17.9%	39.6%	47.0%	39.0%	39.0%
Male	17.9%	36.4%	62.3%	42.1%	40.8%
Other				100.0%	

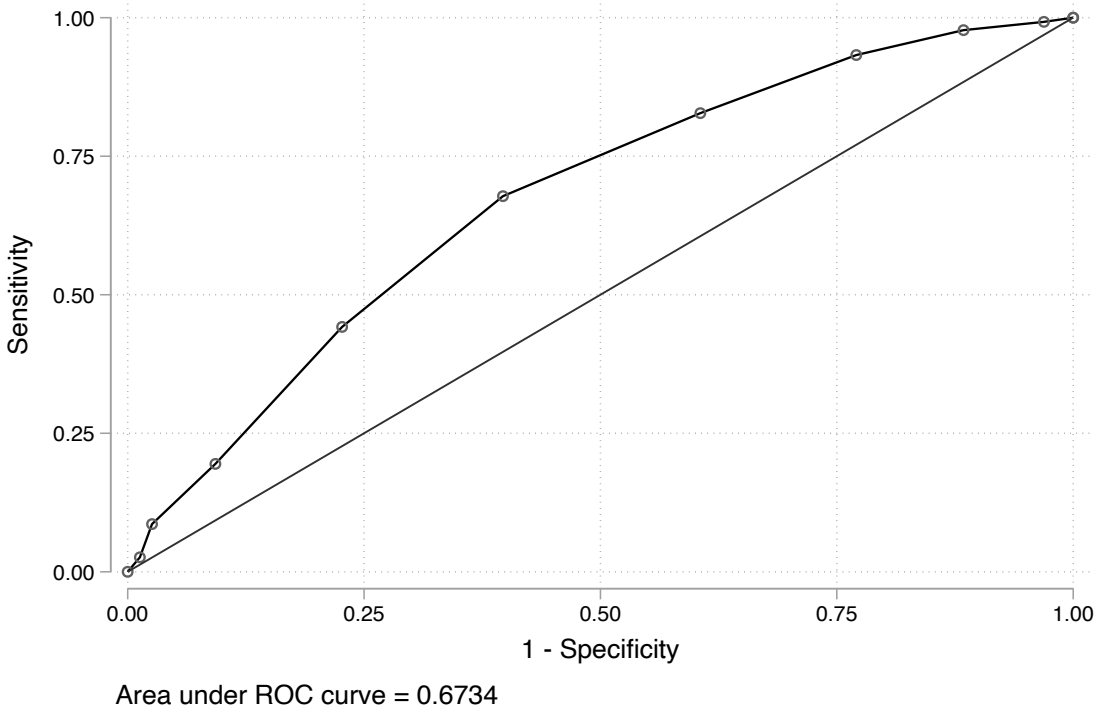
Note: Blanks mean there were zero persons in that category

Table 13: Percent Revoked by Risk and Age

Age	Low	Med	Hi	No Risk Level	Any Risk Score
18-24	13.0%	35.0%	72.7%	46.9%	39.7%
25-34	13.2%	41.7%	64.4%	41.6%	45.2%
35-44	21.7%	43.3%	43.5%	42.1%	39.5%
45-54	20.0%	26.8%	38.5%	39.8%	29.3%
55-64	33.3%	23.5%	58.3%	32.1%	36.6%
65 and over	0.0%	40.0%		20.0%	33.3%
Under 18					66.7%

Appendix V: ROC Analyses

Figure 2: Overall AUC-ROC

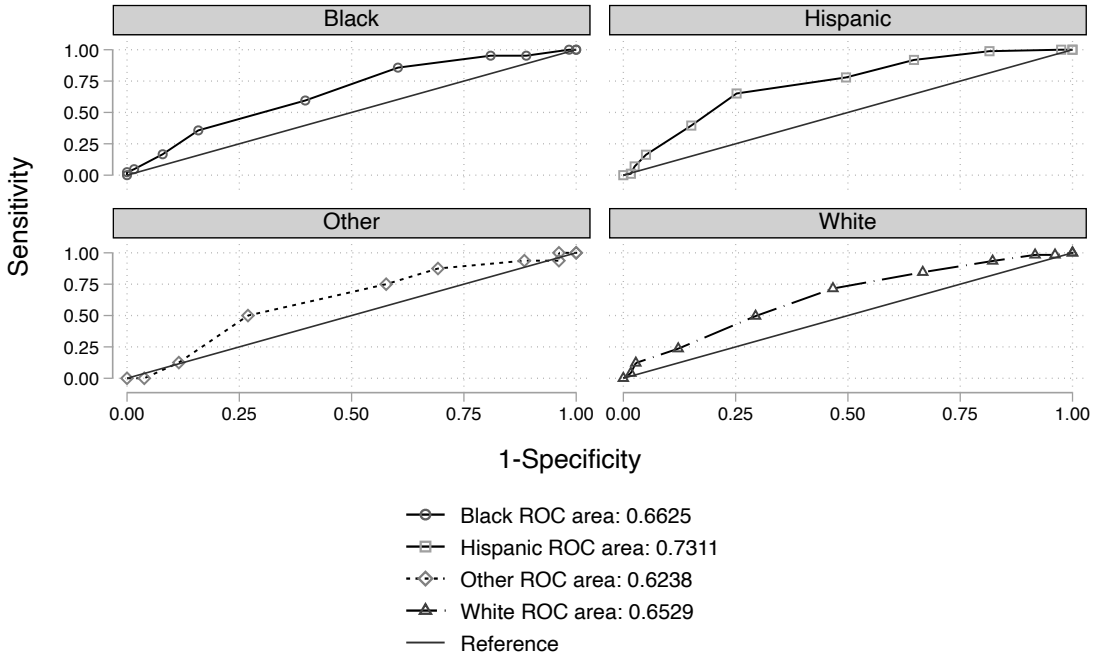


There were no statistically significant differences in ROC by race, gender, age, or most serious offense. Instrument predicted equally well across all categories of these variables.

No statistically significant difference. $\chi^2(3) = 3.45$ p=0.33

Overall: 0.6734

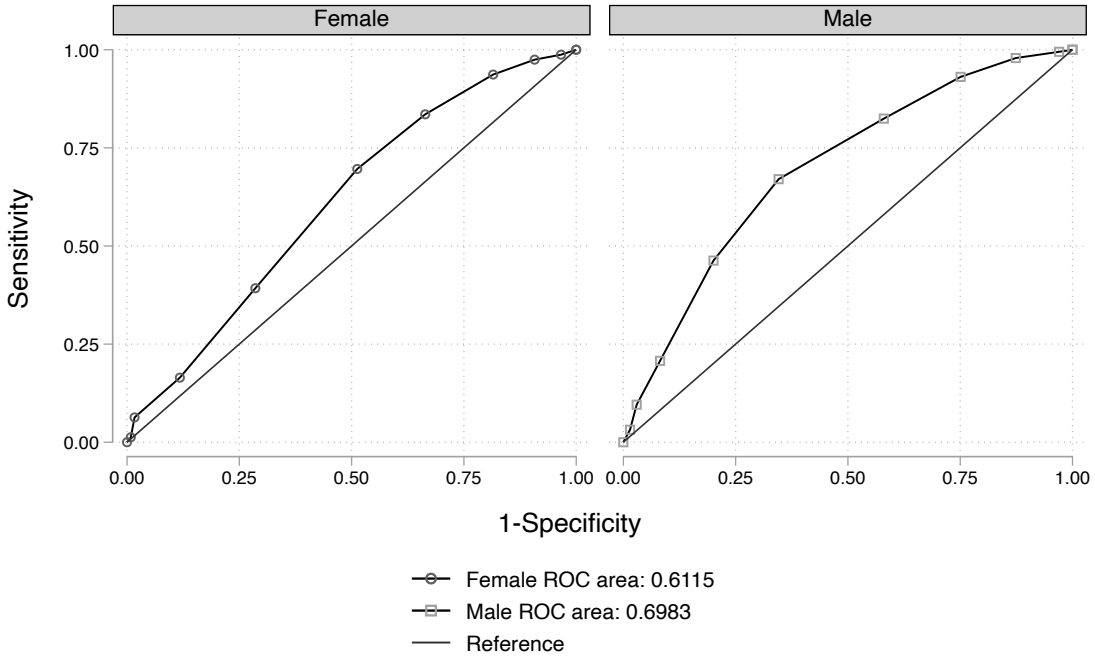
Figure 3: AUC-ROC by race



Graphs by race

No statistically significant difference. $\chi^2(1) = 3.52$ p=0.06

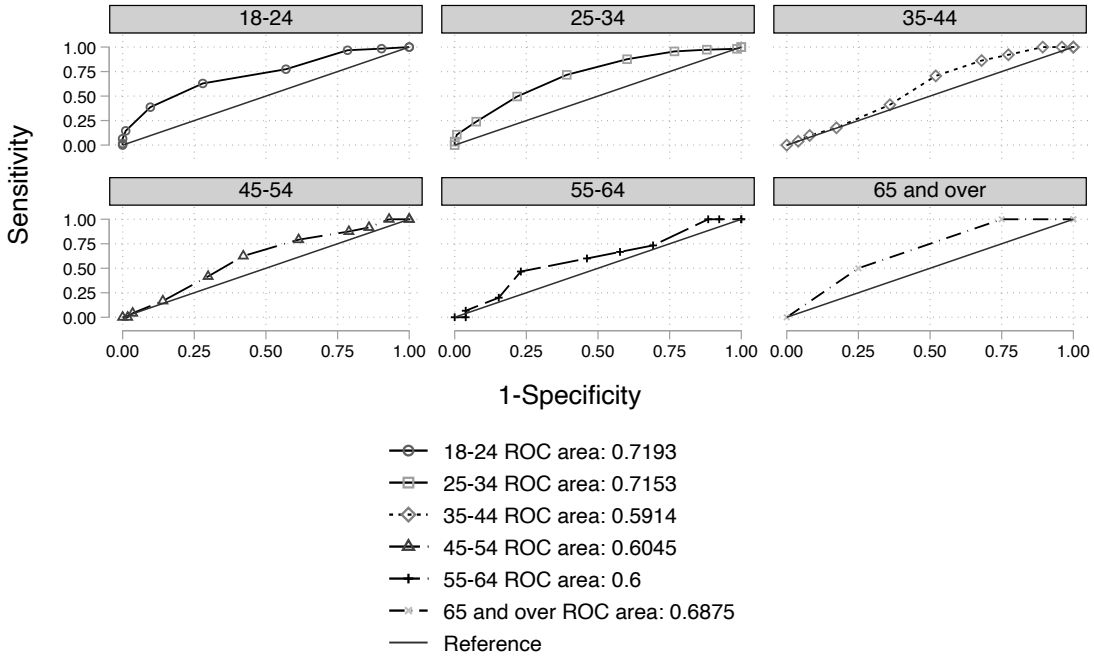
Figure 5: AUC-ROC by gender



Graphs by gender

No statistically significant difference. $\chi^2(5) = 7.31$ p=0.20

Figure 6: AUC-ROC by age

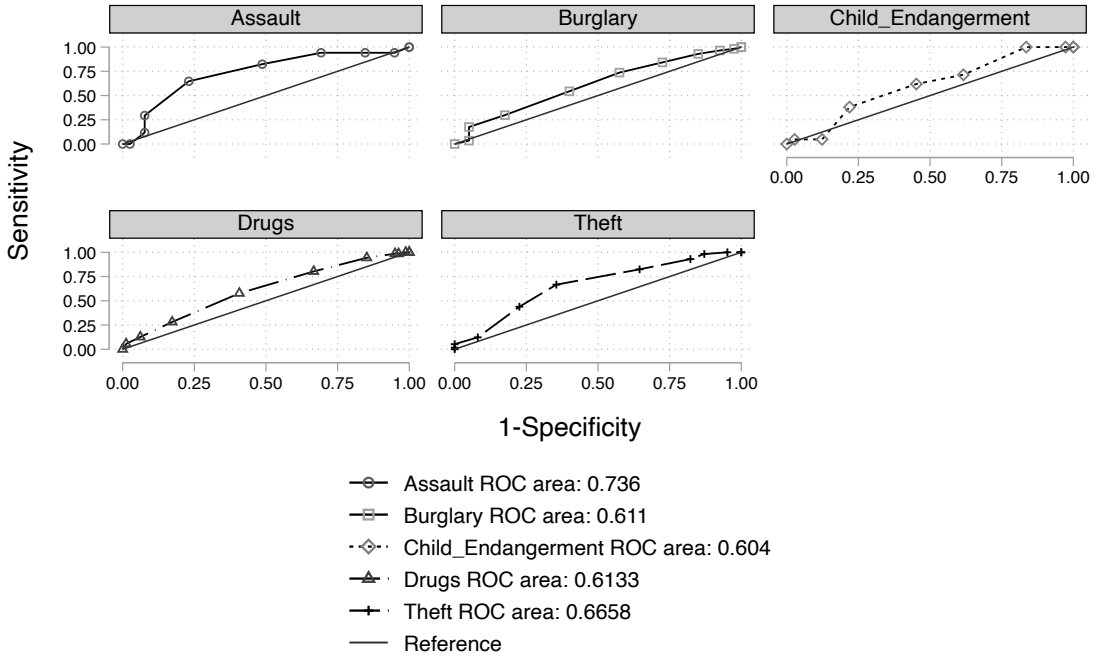


Graphs by age

No statistically significant difference. $\chi^2(4) = 2.88$ p=0.58

Only included most serious offenses for which there were sufficient cases for analysis.

Figure 7: AUC-ROC by most serious offense



Graphs by most serious offense

Table 18: AUC Scores on Pretrial Failure Types

Pretrial failure type	AUC Scores
Failure to appear	0.5895
New crime	0.6138
Technical violation	0.6476
Any failure	0.6734

Note: Values sum to more than 100% due to a small number of persons revoked for multiple reasons.

References

Administrative Office of the U.S. Courts. U.S. Courts. (2020). *Pretrial Risk Assessment.* https://www.uscourts.gov/services-forms/probation-and-pretrial-services/supervision/pretrial-risk-assessment

Alaska Justice Information Center, Bauman, A., Bauman Consulting Group, Payne, T. C., University of Alaska Anchorage Justice Center & Valle, A. (2019) *AK-2S Pretrial Risk Revalidation.* Alaska Department of Corrections.

Bhati, A. & Maxarth LLC. (2019). *Pretrial Services Agency for the District of Columbia Risk Assessment Instrument Re-validation Project.* Washington, DC: Pretrial Ser- vices Agency for the District of Columbia

Clarke, S. (1988). Pretrial release: Concepts, issues, and strategies for improvement. Research in Corrections, 1(3), 1-40.

Grommon, E., Lin, Z., Lowder, E., & Ray, B. (2019). *Monroe County: IRAS-PAT Validation Final Report.* Monroe County, Indiana: Monroe County Sherrif's Office.

Hajian-Tilaki K. (2013). Receiver Operating Characteristic (ROC) Curve Analysis for Medical Diagnostic Test Evaluation. *Caspian journal of internal medicine*, *4*(2), 627–635.

Hickert, A., Prince, K. & Worwood, E.B. (2013). *Pretrial Release Risk Study, Validation, & Scoring: Final Report.* Salt Lake County, UT: Utah Criminal Justice Center.

Hofman, J. M., Sharma, A., & Watts, D. J. (2017). Prediction and explanation in social systems. *Science (New York, N.Y.)*, *355*(6324), 486–488. https://doi.org/10.1126/science.aal3856

Mamalian, C. A. (2011). State of the science of pretrial risk assessment. Washington, DC: Pretrial Justice Institute.

Yolo County. (n.d.). Pretrial Release Program. [Web page]. https://www.yolocounty.org/government/general-government-departments/law-justice/probation/adult-services/pretrial-release-program