

SOLANO COUNTY PRETRIAL RISK ASSESSMENT REPORT

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Introduction

The Solano County Probation Department Pretrial Services program began in April of 2015. The program utilizes the Ohio Risk Assessment System-Pretrial Assessment Tool (ORAS-PAT) to assess an individual's level of risk for pretrial failure-to-appear and re-arrest. This report intends to correspond to the Judicial Council and SB 36 and AB3364 requirements related to a pretrial risk assessment tool validation and testing of disparate impact and bias based on gender and race/ethnicity. In Solano County, eligibility screening for pretrial assessment is conducted at pre-arraignment or earliest point after that. The Solano County Probation Department Pretrial Services program utilizes established eligibility criteria agreed upon by the Court and justice system partners. Those who are not eligible to be screened for pretrial release pre-arrangement are those individuals who are booked on fugitive holds, federal holds, parole holds, formal probation holds, felony warrants, and no bail 1320PC charges. Those individuals who post bail pre-arraignment, the District Attorney decides not to file charges on, or are released with a Promise to Appear (PTA) by the jail are also not screened. All bail eligible felonies, as well as misdemeanor Domestic Violence and Driving Under the Influence (DUI) are screened. All other misdemeanors are not screened, as they are either released with a Promise to Appear (PTA) pre-arraignment or on their own recognizance at arraignment. All non-eligible individuals in pre-arraignment can be referred for pretrial release screening post arraignment, as ordered by the Court. Pretrial Services prepares a report for the Court, summarizing the pretrial risk score, contributing risk factors, positive factors, social factors, and victim information if available. The risk score and pretrial report are used to inform decisions by the Court as to whether an individual is appropriate to be released pretrial along with their release type and condition of release, or if they should be detained.

Data

For this report, the information gathered de-identified information on individuals who received an ORAS-PAT assessment (n=753) in 2019 and 2020 (n=558). Due to COVID-19 implications, the researcher examined the data per year to account for the impacts of COVID-19. The data in this report included the individual ORAS-PAT risk score, failure-to-appear (FTA) outcomes, race, gender, age, city, zip code, new misdemeanor, or felony arrest, pretrial supervision release, own recognizance release (ORR), recommended by Probation, and those referred by the court. The pretrial sample consisted of individuals released on pretrial supervision by the Court who had a completed pretrial risk assessment on file.

ORAS-PAT tool

The ORAS-PAT is a six-item scale that provides a risk score ranging from zero to nine. This score reflects the relative likelihood that an individual released from custody will appear in court or re-offend pending the outcome of their court case. The following weigh how each item is calculated.

Table 1: ORAS Risk Factors and Scoring Guide

Pretrial Items	Response	Weight
Age at first arrest	32 or older	0
	Under 32	1
Number of failure-to-appear warrants past 24 months	None	0
	One warrant for FTA	1
	Two or more FTA warrants	2
Three or more prior jail incarcerations	No	0
	Yes	1
Employed at the time of the arrest	Yes, Full-time	0
	Yes, Part-time	1
	Not employed	2
Residential stability	Lived at current residence past six months	0
	Not lived at the same residence	1
Illegal drug use during the past six months	No	0
	Yes	1
Severe drug use problem	No	0
	Yes	1
Point Range		0-9

Requirement	Definitions by SB 36	Meets requirements
Pretrial Risk Assessment Tool	(Penal Code section 1320.35(b)(1)) A “pretrial risk assessment tool” is defined as an instrument used to determine the risks associated with individuals in the pretrial context.	☑
Pretrial Services Agency Definition	(Penal Code section 1320.35(b)(2)) A Pretrial Services Agency is defined as a local public agency that elects to perform pretrial risk assessments on individuals and provides the assessment information to a court.	Solano County Probation Agency
Validation Definition	(Penal Code section 1320.35(b)(4)) Validate is defined as using scientifically accepted methods to measure both of the following: <ul style="list-style-type: none"> • The accuracy and reliability of the risk assessment tool in assessing (a) the risk that an assessed person will fail to appear in court as required and (b) 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. • Any disparate effect or bias in the risk assessment tool based on gender, race, or ethnicity. 	☑
Validation data	(Penal Code section 1320.35(c)(2)) A pretrial risk assessment tool shall be validated using the most recent data collected by the pretrial services agency within its jurisdictions	2019 & 2020 Data collected
Transparency Requirements	(Penal Code Section 1320.35(d)) A pretrial services agency shall make the following information publicly available: <ul style="list-style-type: none"> • Line items, scoring, weighting, and details on how each line item is scored for each pretrial risk assessment tool that the agency uses. • Validation studies for each pretrial risk assessment tool that the agency uses. 	☑

PART I

PRETRIAL DEMOGRAPHICS

Outcomes for 2019 Data

The number of assessed individuals by age, gender, race, or ethnicity

Table 2 illustrates all individuals in the 2019 data set (n=753), which comprises individuals who received an assessment score regardless of release decision. This population includes individuals released on pretrial supervision, ORR, or who were ordered detained. Table 2 suggests that of those assessed in 2019, 79% were male, and 21% were female. Concerning race, approximately 35% identified as white, 36% as Black, 21% as Latine, four percent as Asian, less than one percent as Native American, and less than three percent as other. The age group most assessed is from age 26-35 at about 40%, followed by 36-45 at 23%, then 18-35 at 16%, 46-55 at 13%, and seven percent are 56 and older.

Table 2: 2019 Demographics

Demographics		N (753)	%
Gender			
	Female	159	21.12
	Male	594	78.88
Race			
	Black	275	36.52
	white ¹	264	35.06
	Latine ²	165	21.91
	Asian ³	28	3.72
	Native Americans	3	.40
	Other	18	2.39
Age			
	18-25	121	16.06
	26-35	296	39.31
	36-45	177	23.51
	46-55	103	13.68
	56 and older	56	7.44

¹ In this report white is intentionally not capitalized. Because white is often associated with white supremacy rather than a culture, white is lowercase and other race and ethnicities are capitalized.

<https://www.theatlantic.com/ideas/archive/2020/06/time-to-capitalize-blackand-white/613159/>

² Latine is the current terminology used to identify the Latino Community as an all-gender and sexual orientation inclusiveness. This 2019 dataset it comprised of "Hispanic" and Mexican as subcategories.

³ Solano allows individuals to self-identify. Therefore, for 2019 data, the category for Asian is comprised of Asian Indian, Filipino, Japanese, Korean, Hawaiian, Pacific Islander, Samoa, and Vietnamese.

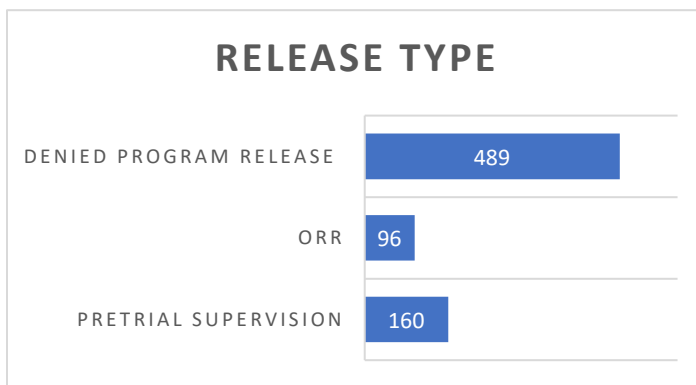
The number of assessed individuals by risk level, booking charge levels⁴, and release type

The ORAS-PAT matrix defines the risk level as the following: someone who scores a two or below low-risk, an individual who scores between three or five points is a medium-risk, and scores of six and above are considered a high-risk. For 2019, 753 people were assessed. Forty-two percent of assessed were high-risk, 40% moderate-risk, and 17% low-risk. Table 3 provides a detailed breakdown of risk levels by the number of individuals and percentage.

Table 3: Individuals Assessed by Risk Level

Demographics		N (753)	%
Risk Level			
0-2	Low	135	17.93
3-5	Moderate	301	39.97
6+	High	317	42.10

Figure 1: Individuals Assessed by Release Type (n=745)



In Figure 1, out of the 745 individuals assessed, 160 were released on pretrial supervision, 96 were released on own recognizance release (ORR), and 489 were denied program release. Although more individuals were granted pretrial supervision, only those assessed by ORAS-PAT are reported in Figure 1. The difference between 753 and 745 is due to another release type, possibly by bail.

Figure 2: Risk Level by Release Type (n=745)

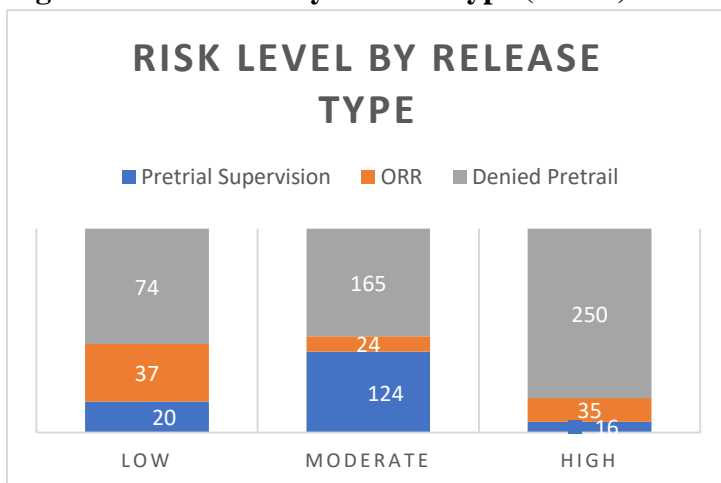


Figure 2 illustrates the number of individuals released by risk level. Out of the 131 determined low-risk, 43% were released on ORR or pretrial supervision. Approximately 47% categorized as moderate were released on ORR or pretrial supervision. In comparison, only 17% of high-risk levels were released on ORR or pretrial supervision. Thus, not all individuals who are scored low are released on pretrial supervision or ORR. The

⁴ Solano Probation is currently unable to track this information. The county is working to retrieve this information and will report it once it has updated data.

decision to release individuals is ultimately the Court's decision regardless of Probation recommendation.

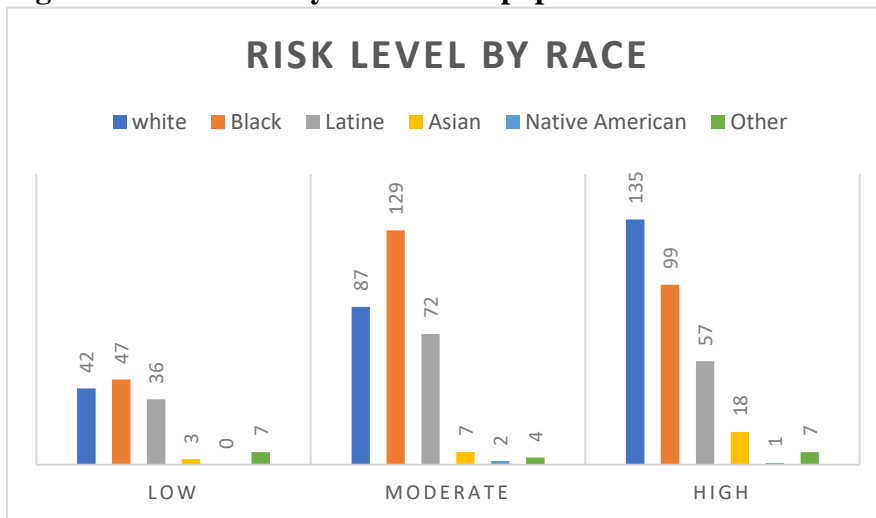
The number and percentage of assessed individuals who receive pretrial supervision by the level of supervision

Table 4 describes those individuals who received pretrial supervision by their risk level. Most of the individuals who were under pretrial supervision were at a moderate level of supervision. This table is different from Figure 2 since Figure 2 captures release type, including ORR and those denied pretrial, while Table 4 captures those on pretrial supervision.

Table 4: Pretrial supervision by the risk level⁵ (n=160)

Demographics		N	%
Pretrial Supervision		(n=160)	
	Low	20	12.50
	Moderate	124	77.50
	High	16	10

Figure 3: Risk Level by Race for all population



In Figure 3, out of the (n=753) individuals on the data set, Black and white individuals are similar low-risk at (n=47) and (n=42). There was an increase in moderate for Black individuals at (n=129). The majority predicted high-risk are white individuals at (n=135), Black individuals (n=99), and Latine (n=57).

⁵ At this moment Solano Probation Department utilizes the risk level to inform supervision however supervision levels were not on the data set provided but will be included in future analysis.

The number and percentage of assessed individuals by supervision level who fail to appear in court as required, are arrested for a new offense during the pretrial period, or have pretrial release revoked by the court due to a technical violation of release conditions

Probation only tracks FTA, new misdemeanor arrest, new felony arrest for those under pretrial supervision. Currently, Probation does not track FTA for those released on ORR. Table 5 illustrates that those assessed as low-risk did not have an FTA or have a new arrest. At the same time, those assessed as high-risk have a 37.5% FTA rate. Thus, considering all risk levels, approximately 28% of individuals either FTA or commit a new crime. For comparison, the ORAS-PAT tool has been validated across multiple jurisdictions; in one study, researchers found that individuals assessed as low-risk had a 5.4% FTA or new arrest rate, 17.8% for moderate-risk, and 29.5% for high-risk (Latessa et al., 2010).

Table 5: Fail to Appear or new conviction for those in pretrial supervision or direct court pretrial.

Monitor Level	Total	FTA		New Misdemeanor		New Felony		Pretrial Revoked		Total Revoked	
		Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
Low	20	0	0	0	0	0	0	0	0	0	0
Moderate	124	23.38%	29	1.6%	2	1.61%	2	.81%	1	27.42%	34
High	16	37.5%	6	6.25%	1	12.5%	2	12.5%	2	68.75%	11
All Levels	160	21.87%	35	1.87%	3	2.5%	4	1.88%	3	28.12%	45

Zip code prevalence

Of the individuals assessed for ORAS-PAT, the majority lived in the following zip codes: 94533(24%), 94590 (14%), and 95687 (9%). Likewise, those individuals assessed and released on pretrial supervision lived in the same zip codes: 94533 (16%), 94590 (11%), and 95687 (12%).

Outcomes for 2020 Data

The number of assessed individuals by age, gender, race, or ethnicity

The descriptive statistics of the data set for 2020 obtained 558 observations, including all assessed individuals regardless of release type. The lower numbers in 2020 compared to 2019 are attributed to the COVID-19 pandemic, which resulted in reduced bookings into the county jail. The Judicial Council of California also adopted an emergency \$0 bail schedule for most felonies and misdemeanors, from Spring to Summer of 2020, which maximized release from the jail in order to prevent the spread of COVID-19 in custody and significantly reduced the number of eligible candidates to be screened for pretrial release. Compared to 2019, in 2020, the male population comprised 82%, while the female population was 17%. The racial and ethnic composition considered assessed for the ORAS-PAT was 29% white, 43% Black, 21% Latine, 5% Asian, less than one percent Native Americans, and less than two percent other. Of those assessed, 39% were between 26 to 35 and 23% between 36 to 45; only 5% were older than 56.

Table 6: 2020 data population (n=558)

Demographics		N	%
Gender			
	Female	100	17.92
	Male	458	82.08
Race			
	Black	239	42.83
	white	164	29.39
	Latine ⁶	117	20.97
	Asian ⁷	29	5.20
	Native Americans	1	.18
	Other	8	1.43
Age			
	18-25	110	19.71
	26-35	219	39.25
	36-45	131	23.48
	46-55	68	12.19
	56 and older	30	5.37

⁶ Latine is the current terminology used to identify the Latino Community as an all-gender and sexual orientation inclusiveness. This 2020 dataset is comprised of "Hispanic" and Mexican as subcategories.

⁷ Solano allows individuals to self-identify. Therefore, for 2020 data, the category for Asian is comprised of Asian Indian, Filipino, Cambodian, Korean, Hawaiian, Pacific Islander, and Laotian.

The number of assessed individuals by risk level, booking charge levels⁸And release type

The ORAS-PAT matrix defines the risk level as the following: someone who scores a two or below low-risk, an individual who scores between three or five points is a medium-risk, and scores of six and above are considered a high-risk. The number of individuals assessed by risk level were 558. Out of those 558, about 20% were low-risk, 44% were moderate, and 36% are high.

Table 7: Individuals by risk level

Demographics		N (558)	%
Risk Level			
0-2	Low	114	20.43
3-5	Moderate	248	44.44
6+	High	196	36.13

Figure 4: Release type (n=528)

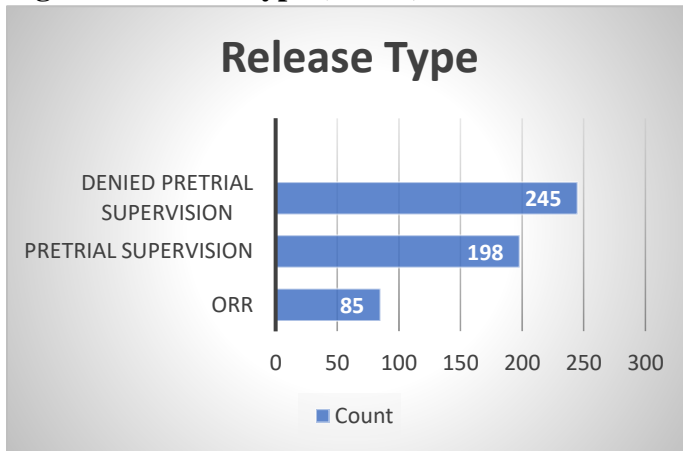


Figure 4 demonstrates 198 released under pretrial supervision, 85 released under ORR, and 245 denied pretrial supervision. The difference between all assessed 558 and 528 in release type is due to those released on bail or deemed ineligible. Most individuals were released by pretrial supervision rather than ORR.

⁸ Charge Level information was unavailable due to Solano County Probation switching to a new case management system in 2020.

Figure 5: Release type by risk level (n=528)

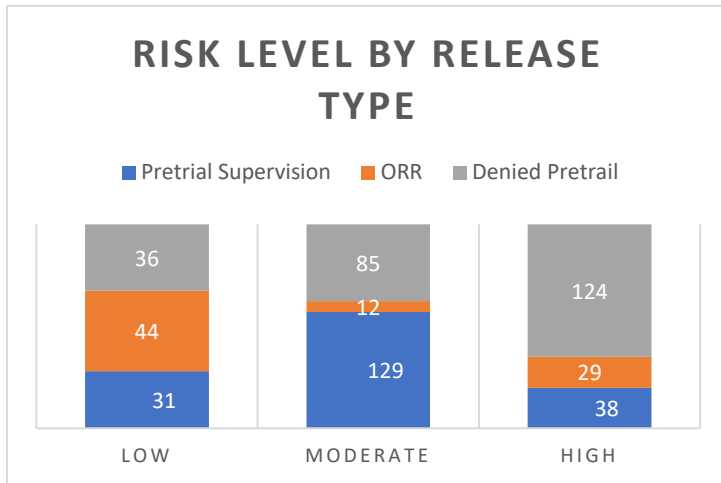


Figure 5 illustrates that 28% of those assessed low-risk, were released on pretrial supervision. In comparison, 57% who scored moderate-risk were released on pretrial supervision. While only 19% of individuals who scored high-risk received pretrial supervision.

The number and percentage of assessed individuals who receive pretrial supervision by the level of supervision

Table 8 describes those individuals who received pretrial supervision by their risk level. Approximately 69% were moderate, approximately 20% were high-risk, and 15% were low-risk.

Table 8: Pretrial supervision by the level of supervision

Demographics		N	%
Pretrial Supervision		(n=198)	
	Low	31	15.66
	Moderate	129	69.15
	High	38	19.19

The number and percentage of assessed individuals by supervision level who fail to appear in court as required, are arrested for a new offense during the pretrial period or have pretrial release revoked by the court due to a technical violation of release conditions

The failure-to-appear rate was the highest among high-risk individuals, with an FTA rate of 37%, while moderate-risk has an FTA rate of 23%. Table 9 demonstrates that it is unlikely that individuals on pretrial supervision will commit a new misdemeanor arrest or new felony arrest. Accounting for all revocations, an individual who scored as low-risk had a 9.68% revocation rate. While those who scored moderate-risk had a 26% revocation rate and those who scored high-risk, had a 42% revocation rate. However, the overall revocation rate for all those who were released on pretrial supervision was 27%. This rate does not account for those released on ORR, as Solano County Probation does not track that information.

Table 9: Fail to Appear or new conviction for those in pretrial supervision or direct court pretrial.

Monitor Level	Total	FTA		New Misdemeanor		New Felony		Pretrial Revoked		Total Revoked	
		Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
Low	31	6.45%	2	0	0	0	0	3.23%	1	9.68%	3
Moderate	129	23.38%	22	2.33%	3	4.65%	6	2.33%	3	26.36%	34
High	38	37.5%	11	2.63%	1	5.26%	2	5.26%	2	42.11%	16
All Levels	198	21.87%	35	2.02%	4	4.04%	8	3.03%	6	26.77%	53

Zip code prevalence

Of the individuals assessed for ORAS-PAT, the majority lived in the following zip codes: 94533(21%), 94590 (9.32%),95687 (8.6%), 94591 (5%), and 94585 (5%). Likewise, of those individuals assessed who are released on pretrial supervision or ORR live in the zip codes 94533 (20%), 94590 (10%), 95687 (12%), and 94585 (6%).

PART II
PRETRIAL RISK
ASSESSMENT TOOL
VALIDATION REPORT

Data

For this report, the researcher gathered de-identified information on individuals who received an ORAS-PAT assessment and were released under pretrial supervision (n=160) in 2019 and 2020 (n=198). Although more individuals were released under own recognizance release (ORR), the Solano Probation Department does not collect FTA for that population. Therefore, the tool validation focuses on the pretrial supervision population with FTA, new arrest, and revocation data. Due to COVID-19 implications, the researcher examined the data per year to account for the impacts of COVID-19. The data in this report included the individual ORAS-PAT risk score, FTA outcomes, race, gender, new misdemeanor or felony arrest, pretrial supervision release, and total revocations, including technical violations. The pretrial sample consisted of individuals released on pretrial supervision by the Court who had a completed pretrial risk assessment on file.

Background

Despite the intent of risk assessments to reduce bias, scholars challenge their efficacy. To address these concerns, scholars have empirically tested if an automated tool produces fewer biased outcomes using a logistic regression model along with testing for variance among subgroups categories (Dressel & Farid, 2018). Risk assessment studies have been contested, and some scholars find limited evidence of disparities. For example, Skeem (2016) argues, "the intercept of the relationship between Post Conviction Risk Assessment (PCRA) scores and violent arrest is significantly lower for White than for Black offenders." The state of contention relies on the definition and methods used to test disparate outcomes and bias. Scholars like Skeem argue that bias can be tested by comparing differences in subgroups. Contrary, Chouldechova (2017) argues that fair prediction can be best studied by testing false positives and false negatives. In this case, a false positive is scored high and predicted to fail but did not fail. In contrast, a false negative is scored low and expected not to fail but failed. Scholars and advocates argue that what should be at the core is the disparate impact that tools can inadvertently create. Disparate impact refers to the evidence that distribution by race or ethnicity varies across categories of the risk assessment instrument and that these individuals with high-risk scores receive a stricter penalty. Disparate impact focuses on the outcome from the risk score. It is a social and ethical concept, not statistical (Chouldechova, 2017).

The Ohio Risk Assessment System has been validated by the University of Cincinnati Corrections Institute (UCC) and the Ohio Department of Rehabilitation and Corrections (ODCR). One of those instruments under the ORAS umbrella is the Pretrial Assessment Tool (PAT). The ORAS-PAT concluded that the total score was correlated with outcome ($r=.22$), suggesting that as the score increases, the likelihood to re-offend or failing to appear increases (Latessa, 2010). Other counties have validated their pretrial assessment tools locally in California through logistic regression and the Receiver Operating Characteristics (ROC) analysis (Barno, Williams, & Nevárez Martínez, 2019; Lovins & Lovin, 2016). The ROC is a probability curve measured by the Area Under the Curve (AUC) to predict the accuracy of false positives with false negatives to determine the tool's

predictability. Likewise, an AUC score can distinguish between classes where a score of one indicates a good measure of accuracy, a score of zero indicates the worst measure of separability, and a .5 indicates the model is no better than chance at predicting FTA or new arrest (Rice & Harris, 2005). Thus, the Area Under the Curve (AUC) was used to compare the predictive accuracy. The AUCs can be read as the following a score of .50 indicates chance prediction, .56 a small predictive effect, .64 a medium predictive effect, .71 a significant predictive effect, and one a perfect prediction (Rice & Harris, 2005). To truly understand how the population and tool behave, the jurisdiction must validate with the local Solano County population.

Method

First, the report focuses on reporting descriptive statistics on individual-level information and percentage for gender, race, risk score, and risk level. A logistic regression was run to validate⁹ ORAS-PAT capacity to predict the likelihood of FTA accurately among the Solano population. Additional logistic regression models were conducted to differentiate if the tool also predicts new arrest and total revocations. For the total revocations, that is inclusive of FTA, new arrest, and technical violations. Specifically, the question under review determines if higher scores accurately predict FTA, new misdemeanor, or felony arrest. Probation only collects data on FTA for those who are on pretrial supervision not for those individuals released on ORR by the court.

2019 Tool Validation

The 2019 data consisted of n=160, of which 76% were male, and approximately 24% were female. The sample race composition was 47% Black, 32% white, 17% Latine, less than three percent Asian, and one percent other. Although in the general demographics of 2019 data, there was a record of Native Americans, none were on pretrial supervision in 2019. Some may have been released on ORR or bail, but this report does not test the outcomes of individuals on ORR or cash bail release. Tables 10-13 illustrate the descriptive statistics for the sample population on pretrial supervision. It illustrates that the overall FTA rate was 21%, the rate for new arrest was 4%, and total revocations were 27%. In addition, the average total risk score was four, and most individuals released on pretrial were moderate-risk. The majority released on pretrial supervision were moderate-risk because low-risk were more likely to be ORR.

⁹Solano currently changed case management systems and was unable to retrieve individual pretrial item scores. Once that is accessible, the validation testing of the ORAS-PAT items successfully predicted FTA risk can be conducted. For now, what is validated is the total risk score and variance among risk levels for subgroups.

Table 10: 2019 sample population those released on pretrial supervision

Demographics		N (160)	%
Gender			
	Male	122	76.25
	Female	38	23.75
Race			
	white	51	31.88
	Black	75	46.88
	Latine ¹⁰	27	16.88
	Asian ¹¹	5	3.13
	Native Americans	0	0
	Other	2	1.25

Table 11: Binary Variables

Variable	Obs.	No	Yes	Mean	Min	Max
FTA	160	125	35	.21875	0	1
New Arrest	160	153	7	.04375	0	1
Total Revoked	160	116	44	.275	0	1

Table 12: Continuous variables

Variable	Obs.	Mean	Std	Min	Max
Risk	160	4.03125	1.5106	0	9

Table 13: Categorical Variable

Variable: Risk Level	Obs.
Low	20
Moderate	124
High	16

Research question:

How successful was the total ORAS-PAT assessment score at predicting the likelihood of FTA among the Solano pretrial population?

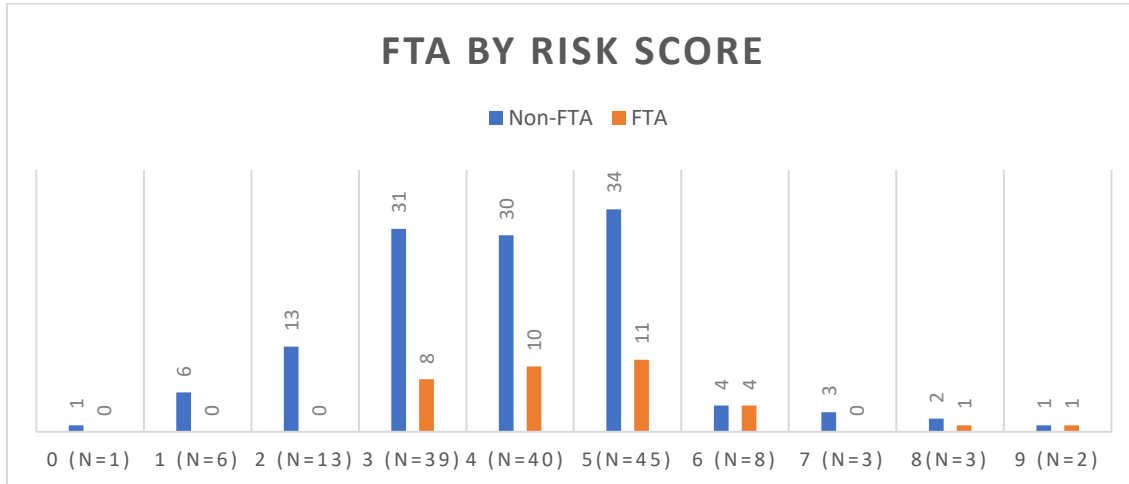
A chi-square test examines the risk scores and risk level accuracy to predict FTA. First, the FTA rate was examined by risk score, as shown in Figure 6. Then, the FTA rate was examined by risk level. In theory, the risk scores should indicate that as the risk scores increase, so do the FTA rates.

¹⁰ Latine is the current terminology used to identify the Latino Community as an all-gender and sexual orientation inclusiveness. It is comprised of "Hispanic" and Mexican as subcategories.

¹¹ The category for Asian is comprised of Asian Indian, Filipino, Japanese, Korean, Hawaiian, Pacific Islander, Samoa, and Vietnamese

In Figure 7, the FTA rate was displayed by risk level. Individuals were placed in three different risk levels: low, moderate, and high. Low-risk is an individual who scored 0-2, a moderate-risk 3-5, and high-risk 6-9.

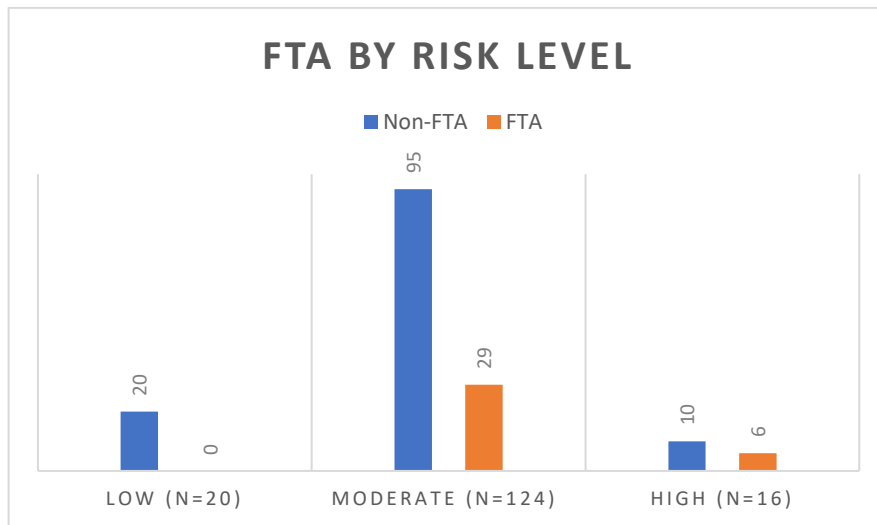
Figure 6: FTA by Risk Score



$$\chi^2 (9, N=160) = 11.74; (p > .05) r = .188$$

The following n=160 depicts those that FTA by risk score. Figure 6 demonstrates the FTA rate by risk score for the population released on pretrial supervision. It was observed that those who scored 0-2 had a zero FTA rate. While those who scored three had a 20.51% FTA rate, those who scored four had a 25% FTA rate, those who scored five had a 24.44% FTA rate, those who scored six had a 50% FTA rate, those who scored seven had a zero FTA rate, those who scored eight had a 33.33% FTA rate, and those who scored nine had a 50% FTA rate. Although generally, it was observed that there was an increase in FTA rates, there were no FTAs for those who scored a seven on the risk assessment. The chi-square test was conducted to test if the increases in FTA rates across ORAS-PAT assessment scores are statistically significant ($\chi^2 (9) = 11.74$ ($p = .228$)), the test indicated that the relationship between FTA rates and risk score were not statistically significant. The strength association of Pearson's r are the following 0 is none, .01-.09 is a weak association, .10 - .29 is a moderate association, .30 - .99 is evidence of strong association, and a perfect association is 1. The Pearson's r of .188 indicates a moderate association between the risk score and FTA.

Figure 7: FTA by risk level



$$\chi^2 (2) = 8.0516 (p < .01) \text{ Gamma} = .6282$$

Figure 7 demonstrates that FTA rates were highest for moderate and high-risk levels and these increases were statistically significant. The chi-square test indicates that the rise in FTA rates across risk levels is statistically significant, unlike individual risk scores. The gamma coefficient measures the strength of the relationship between ORAS-PAT scores and FTA, ranging from -1 to +1. The gamma for risk scores was .3203 while the gamma for risk level was .6282; therefore, the risk level increases the chances of correct classification on FTA. The gamma coefficient measures the strength relationship of two ordinal variables. The measurement of a gamma coefficient is similar to the Pearson's r measurement. The gamma coefficient is measured as the following 0 is none, .01-.09 is a weak association, .10 - .29 is a moderate association, .30 - .99 is evidence of strong association, and a perfect association is 1. The different use of a gamma coefficient versus Pearson's r is because the risk level categories are an ordinal value rather than a continuous number. The gamma coefficient measuring the relationship strength between risk levels and FTA is .6282, indicating a strong association. The gamma coefficient was tested for risk scores yielding a .3203 gamma coefficient, a moderate association. However, because risk scores are continuous, a better test is the Pearson's r test. Both gamma coefficients were provided to highlight further that even if testing differently, risk levels are a stronger association with FTA ($\chi^2 (2) = 8.0516 (p = 0.018)$).

In addition to examining the failure-to-appear rates among risk scores and risk levels, a logistic regression examined the likelihood to predict FTA as the dependent variable, and independent variables were risk score, female, Black population, and Latine population. For this model, female, Black, and Latine are binary variables. Therefore, if an individual is female, it is captured as one. Likewise, if an individual is Black, it is a one and zero for non-Black. If someone is Latine, it is captured as one for the binary variable and zero if non-

Latine. Other races such as Asians, Native Americans, and others were not captured because they were very minimal in the pretrial supervision to provide a prediction.

Table 14: Logit Regression testing failure-to-appear, new arrest and revocations by race and gender

VARIABLE	MODEL I FTA OR(SE)	MODEL II NEW ARREST OR (SE)	MODEL III TOTAL REVOKED OR (SE)
FEMALE	.99609 (.4456)	-----	.7958 (.3546)
RISK SCORE	1.3590** (.1799)	1.649** (.3847)	1.5074*** (.1986)
BLACK	.8866 (.3944)	2.833 (2.609)	1.3208 (.5519)
LATINE	1.60 (.8639)	-----	1.3869 (.7411)
AUC	.6418	.7195	.6558
N	160	102	160

Note: *** significant at the 1% level ** Significant at the 5% level and * significant at 10 %.

OR= Odds Ratio and SE= Standard Error

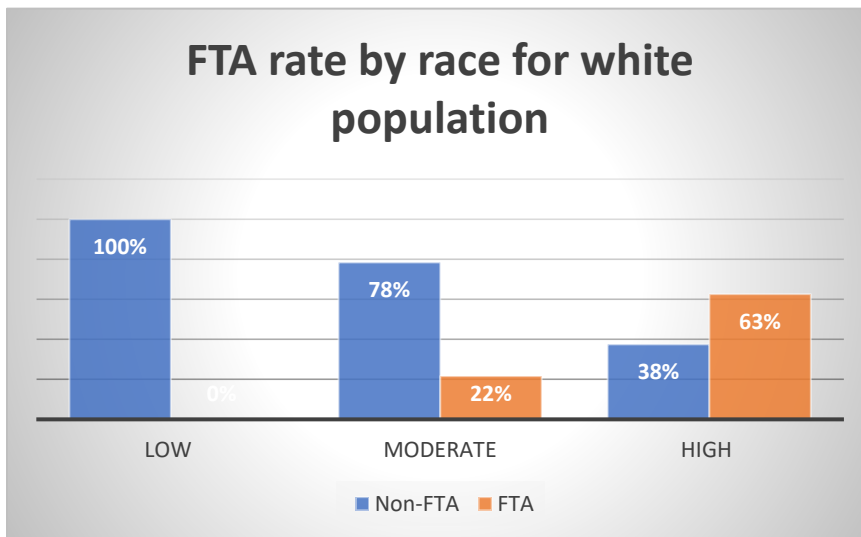
In Table 14, the results find that the risk score is statistically significant at predicting FTA at the 95% confidence level. An odds ratio of less than one indicates a lower outcome. For the model I, the risk score was associated with a 35% increase in the odds of pretrial failure (OR=1.35). If someone was a female, Black or Latine was not statistically significant at explaining FTA. The lack of statistical significance does not indicate racial disparity but indicates that race does not predict FTA. In model II n=102 predicts the likelihood that, risk score, an individual being Black predicts a new arrest. In model III n=160, the model predicts the likelihood that female, risk score, an individual being Black or Latine predict total revocations. The only statistically significant variable is the risk score in both models, again indicating that Black nor Latine predict a new arrest or total revocations. To compare the models, the AUC score .6418 in model 1 and .6558 in model III indicates a medium predictive effect, while the model II AUC score is .71, a significant predictive effect. However, it is essential to note that model II dropped observations of females or Latine. The model omitted the variables which might explain the increase in predictive effect. Although the binary variables for Black or Latine were not statistically significant at predicting FTA, arrest, or revocation, some scholars might argue that this demonstrates free of predictive bias. To ensure there is no predictive bias, further studies need to account for differences in risk levels among race and gender.

Research Question

Does ORAS-PAT produce racial or gender bias?

An analysis was conducted to test if the ORAS-PAT produces racial bias. Specifically, if the risk levels produce racial bias using FTA as the outcome. Skeem & Lowenkamp (2016) argue that similar distributions across groups would indicate free of predictive bias while differential distributions would indicate predictive bias. Other scholars like Chouldechova argue that bias is tested using false-positive rates. For this report, distributions across groups were tested to determine bias. In addition, to test differences across groups, the AUC score was tested for each subgroup, and then a test for difference between AUC scores was run to determine predictive bias. A statistically significant difference between AUC scores would indicate predictive bias, while an insignificant difference would suggest there is no predictive bias.

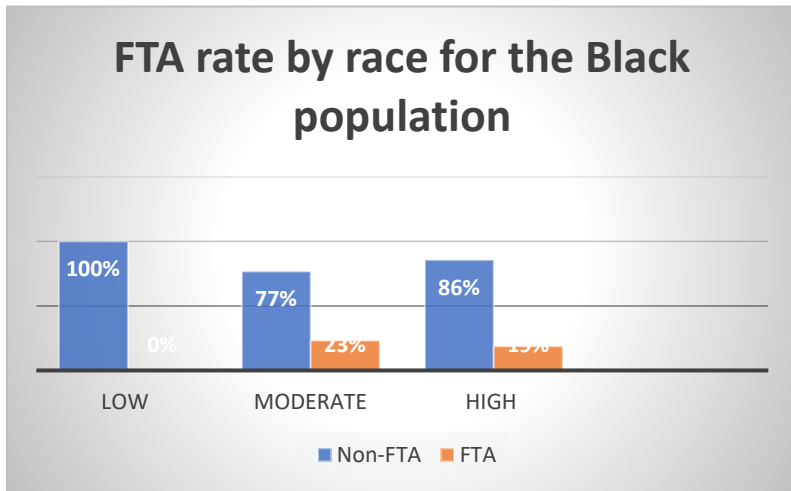
Figure 8: FTA rate by risk level for the white population n=51



In Figure 8, FTA rates increased by risk level for individuals who are white. The AUC score is .7014 suggesting a strong predictive effect.

AUC score=.7014

Figure 9: FTA rate by risk level for the Black population n=75

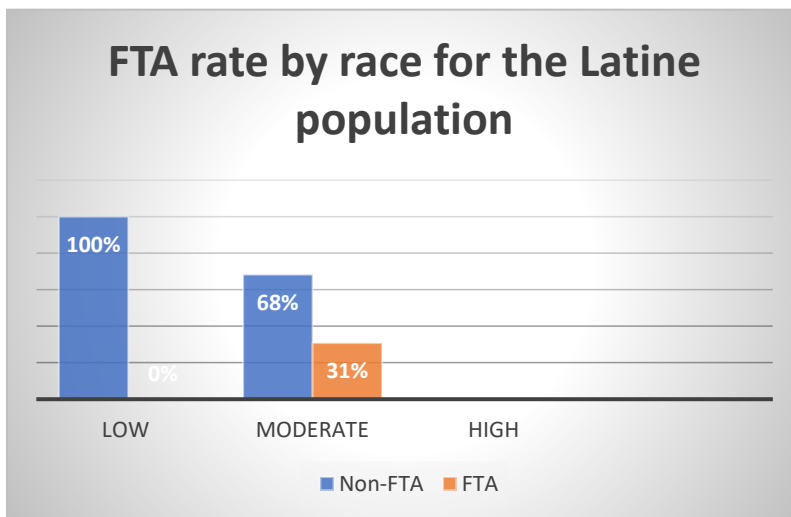


In Figure 9, the FTA rate distribution for individuals who are Black increased for moderate-risk level but decreased for high-risk level. The AUC score is .5779 suggesting that it is marginally better than chance to predict FTA rates by risk level for individuals who are Black. The AUC score of .5779 might indicate that the ORAS-PAT risk level might not predict FTA as strong for individuals who are Black than the

white population. However, when testing for significance this was insignificant.

AUC score= .5779

Figure 10: FTA rate by risk level for the Latine population n=27

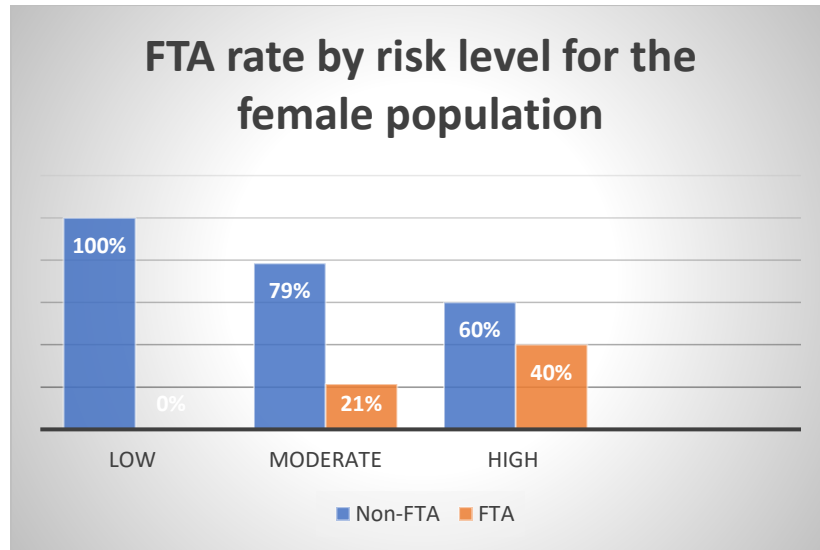


In Figure 10, the FTA rates do not increase as risk levels increase. There was no one released on pretrial supervision that is Latine and high-risk level. The AUC score of .5263 suggest that the predicting FTA rate for Latine by risk level is marginally better than chance. The AUC score for the Latine population (.5263) significantly differs ($p \leq .05$) from the AUC score for the white population. This indicates that the

ORAS-PAT risk level might not predict FTA as strongly for Latine population as for the white population.

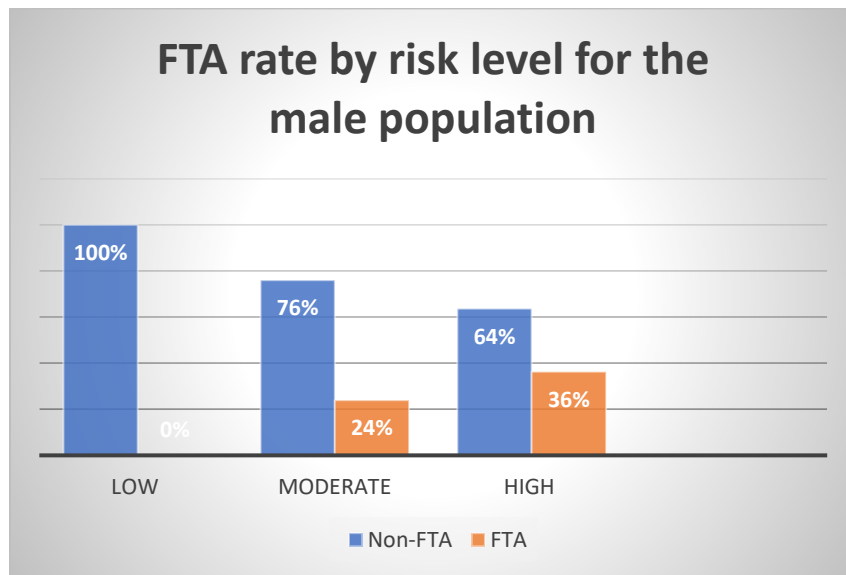
AUC score=.5263

Figure 11: FTA rate by risk level for the female population n=38



AUC score=.6375

Figure 12: FTA rate by risk level for the male population n=122



AUC score=.6045

Figures 11 and 12 illustrate the FTA rates by risk level for females (n=38) and males (n=122). For both females and males, the FTA rate increases as risk levels increase. In addition, the AUC score for females is .63, while for males, it is .6045, a medium predictive effect. There was no statistical difference between females and males, suggesting no predictive bias in terms of gender.

The previous models examined predictive bias and the prediction of the likelihood of FTA. It is also essential to test disparate impact across racial, ethnic, and gender groups. Drawing from (Skeem & Lowenkamp, 2016; Barno, Williams, & Nevárez Martínez, 2019), disparate impact is

measured by the difference in means scores of risks. A statistical difference in mean scores could potentially impact more restrictive conditions on pretrial release. For example, if someone who identifies as Black is scored higher and those differences are statistically significant, that would indicate that a difference in mean scores would cause Black individuals to be less likely released on pretrial. There were no statistical differences in mean scores between males and females. There were no statistical differences in mean scores for race or ethnicity. The findings suggest there is no disparate impact based on race, ethnicity, or gender. Tables 15 and 16 demonstrate the mean risk scores based on race, ethnicity, and gender categories. It was observed that the mean risk score of individuals overall assessed is higher than the sample under pretrial supervision.

Table 15: Disparate impact: risk scores on those released under pretrial supervision (n=160)

Mean Risk Scores							
	Males (n=122)	Females (n=38)	White (n=51)	Black (n=75)	Latine (n=27)	Asian (n=5)	Other (n=2)
Mean Risk Score	4.0645	4.4651	4.25	3.88	4.07	3.8	4

There were no statistical differences in mean scores by race, ethnicity, or gender.

Table 16: Disparate impact: mean risk regardless of all assessed (n=753)

Mean Risk Scores								
	Males (n=594)	Females (n=159)	White (n=264)	Black (n=275)	Latine (n=165)	Asian (n=28)	Native American (n=3)	Other (n=18)
Mean Risk Score	4.75	4.98	5.13	4.66	4.5	5.43	5.43	3.89

There were no statistical differences in mean scores by race, ethnicity, or gender.

Discussion

Overall, the FTA rates increased as the ORAS-PAT risk level increased, and these increases were statistically significant. Indicating that the increases in FTA rate are not by chance; the risk level does predict FTA. At the same time, the FTA rates increase as the ORAS-PAT risk score increases are not statistically significant. The findings suggest that the total score can be adjusted to predict the Solano population accurately. Those who received a score of 7 did not fail to appear as predicted. The logistic regression model predicting the likelihood of FTA, arrest, and total revocations were consistent that risk score was statistically significant at predicting FTA, arrest, or total revocation. Although the covariates of race and gender do not seem to predict FTA, arrest, or revocations, suggesting no racial bias. The strength of ORAS-PAT on FTA rates by subgroups means that the prediction for Black or Latine individuals is less compared to whites. The predictive strength varied for Black and Latine individuals. The difference in strength may be due to the high-risk category, which is lower than expected for high-risk level individuals. Testing individual items of the tool will allow a better explanation of why there is a difference in prediction

strength. At this moment, Probation is unable to retrieve that data due to a change in their data management system. What can be concluded is that the risk levels do not accurately predict for nonwhites, not because they have a higher FTA, but because they have a lower FTA. There was no gender bias, and the tool predicted a slight increase in FTA rates as risk levels increased by gender.

2020 Tool Validation:

The 2020 data consisted of n=198, of which 78% were male, and approximately 22% were female. The sample race composition is 40% Black, 25% white, 24% Latine, approximately 9% Asian, less than one percent Native American, and less than one percent other. Tables 17 - 20 illustrate the descriptive statistics for the sample population released under pretrial supervision. It illustrates that the overall FTA rate was 17%, the rate for new arrest was 6%, and total revocations were 27%. In addition, the average total risk score was four, and most individuals released on pretrial are moderate-risk level. Most moderate-risk level individuals are released on pretrial supervision because low scores are more likely to be ORR.

Table 17: Descriptive Statistics for 2020 data

Demographics		N (198)	%
Gender			
	Male	155	78.28
	Female	43	21.72
Race			
	white	51	25.76
	Black	80	40.40
	Latine ¹²	48	24.24
	Asian ¹³	17	8.59
	Native American	1	0.51
	Other	1	.51

Table 18: Binary Variables

Variable	Obs.	No	Yes	Mean	Min	Max
FTA	198	163	35	.1768	0	1
New Arrest	198	186	12	.0606	0	1
Total Revoked	198	145	53	.2676	0	1

Table 19: Continuous variables

Variable	Obs.	Mean	Std	Min	Max
Risk	198	4.1515	1.7875	0	9

¹² Latine is the current terminology used to identify the Latino Community as an all-gender and sexual orientation inclusiveness. It is comprised of "Hispanic" and Mexican as subcategories.

¹³ The category for Asian is comprised of Asian Indian, Filipino, Japanese, Korean, Hawaiian, Pacific Islander, Samoa, and Vietnamese

Table 20: Categorical Variables

Variable: Risk Level	Obs.
Low	31
Moderate	129
High	38

Research question:

How successful was the total ORAS-PAT assessment score at predicting the likelihood of FTA among the Solano pretrial population?

Figure 13: FTA by risk score

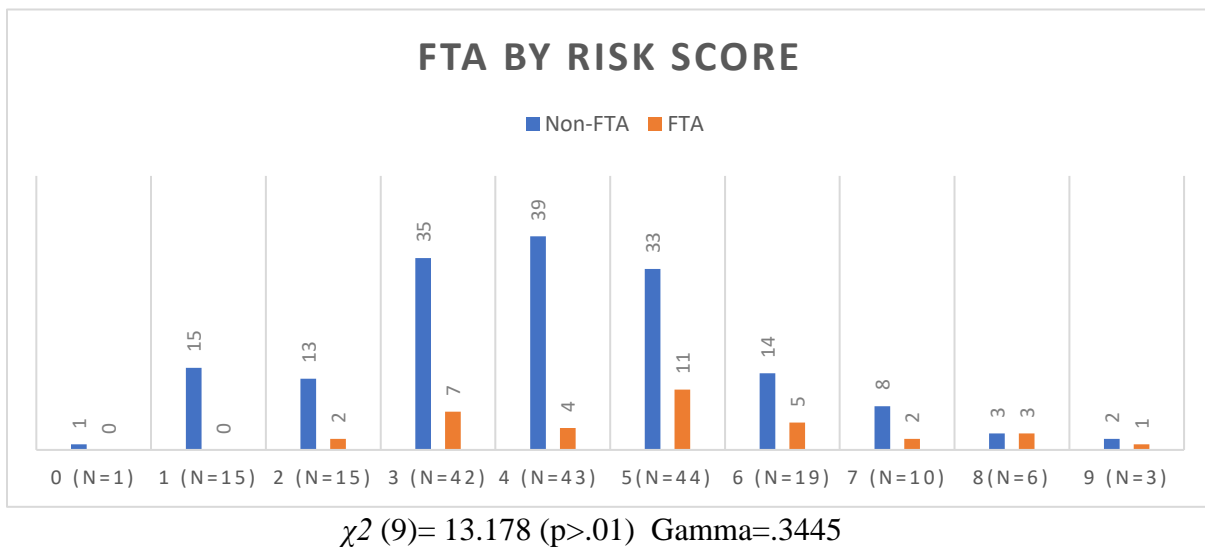


Figure 13 (n=198) depicts those that as the ORAS-PAT risk score increases, the FTA rate is not consistent with the increase. The p-value ($p = 0.155$) indicates that the relationship between the ORAS-PAT risk scores and FTA is not statistically significant. The graph demonstrates that those who scored higher marginally increase in FTA; there is an exception for those who scored 3-4 and 6-7. To be more specific, those who scored a risk score of three and four had an FTA rate of 10%, those with a score of five had an FTA rate of 33%, those who scored a six had an FTA rate of 35%, those that scored a seven had an FTA rate of 25%. In comparison, those who rank low had a zero percent FTA rate. The increase in FTA rates is uninformed.

Figure 14: FTA by risk level

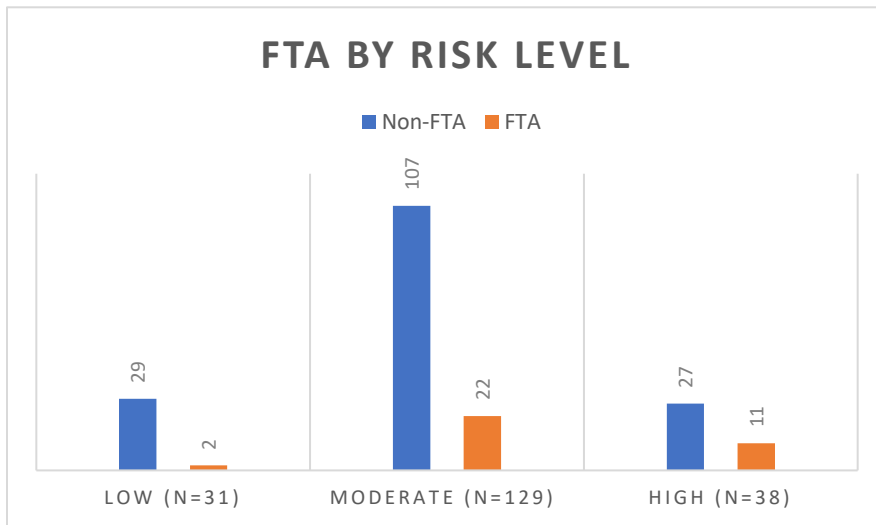


Figure 14 demonstrates that FTA increases relatively as risk level increases, and the increase was statistically significant (Chi2=6.0356; $p < .05$). The p-value at 0.04 indicates it was statistically significant at the 95 % CI. The gamma coefficient is .4246 suggesting a modest relationship of risk levels. Like 2019, risk levels are statistically significant and

have a more robust gamma coefficient meaning a stronger linear relationship than the individual risk scores.

$$\text{Chi2}(9)=6.0356 (p<.05) \text{ Gamma}=.4246$$

Table 21: Logit Regression predicting failure-to-appear, new arrest and total revocations (n=198)

Dependent variable	Model I FTA OR(SE)	Model II New Arrest OR(SE)	Model III Total Revocations OR(SE)
Female	.4855 (.2569)	.6543 (.5234)	.3945** (.1828)
Risk Score	1.3882*** (.1511)	1.2099 (.1949)	1.4053*** (.1386)
Black	.6377 (.2898)	2.8174 (2.355)	.6793 (.2650)
Latine	1.2793 (.6205)	3.4624 (3.1002)	1.1780 (.5115)
AUC	.6932	.6505	.6861

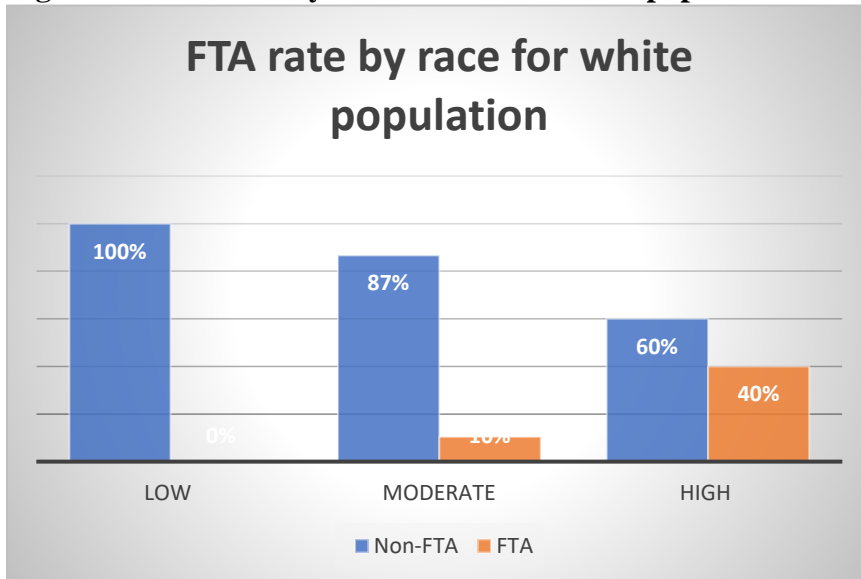
Note: *** significant at the 1% level ** Significant at the 5% level and * significant at 10 %. OR= Odds Ratio and SE= Standard Error

A logistic regression was run to predict the odds ratio of FTA for those that were released on pretrial supervision. The R2 of the model is .0674, indicating that the variables in the model explain 6% of the variance. An odds ratio of less than one indicates a lower outcome. An odds ratio above one indicates an increased likelihood of FTA. In Table 21, the results find that the risk score was

statistically significant at predicting FTA at the 95% confidence level. It indicates that the risk score was associated with a 38% increase in the odds of pretrial failure (OR=1.38). If someone was a female, Black or Latine was not statistically significant at explaining FTA. The nonstatistical significance does not indicate there is no racial disparity but indicates that race does not predict FTA. In model II predicting new arrest, no variable is statistically significant at predicting the likelihood of a new arrest. In model III, if someone is female, it is statistically significant; they are less likely to have a new revocation. Holding others constant, the risk score was associated with a 40% increase in the odds of total revocation (OR=1.40). Therefore, the total risk score is statistically significant at predicting FTA and total revocations but not a new arrest.

Although race is not predictive of FTA, new arrest, or total revocations to further assess significant differences in the ORAS-PAT’s capacity to predict FTA across racial, ethnic, and gender groups, additional tests are needed. The following examines the capacity across race and gender.

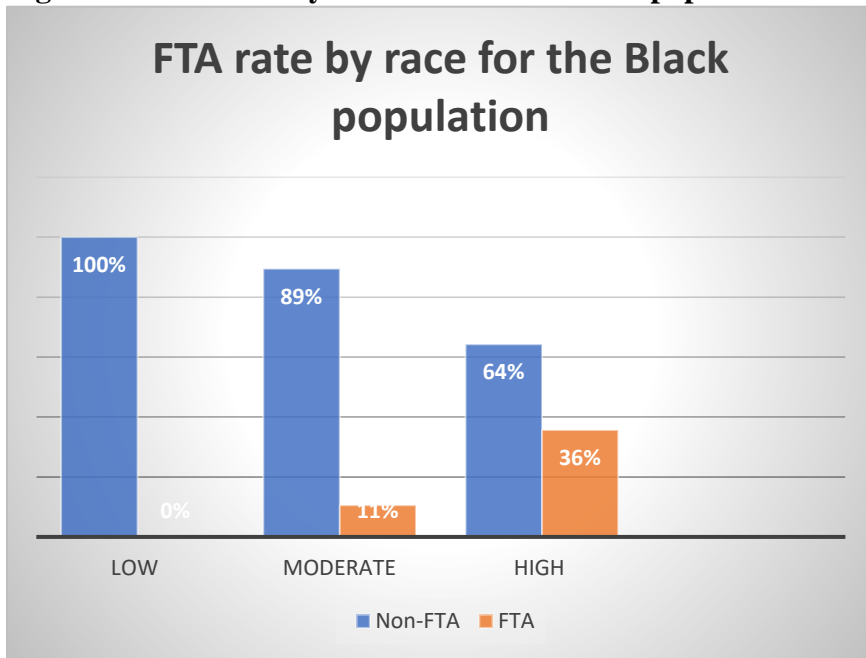
Figure 15: FTA rate by risk level for the white population n=51



In Figure 15, FTA rates increased by risk level for individuals who are white. The AUC score is .7540 suggesting a strong predictive effect.

AUC score=.7540

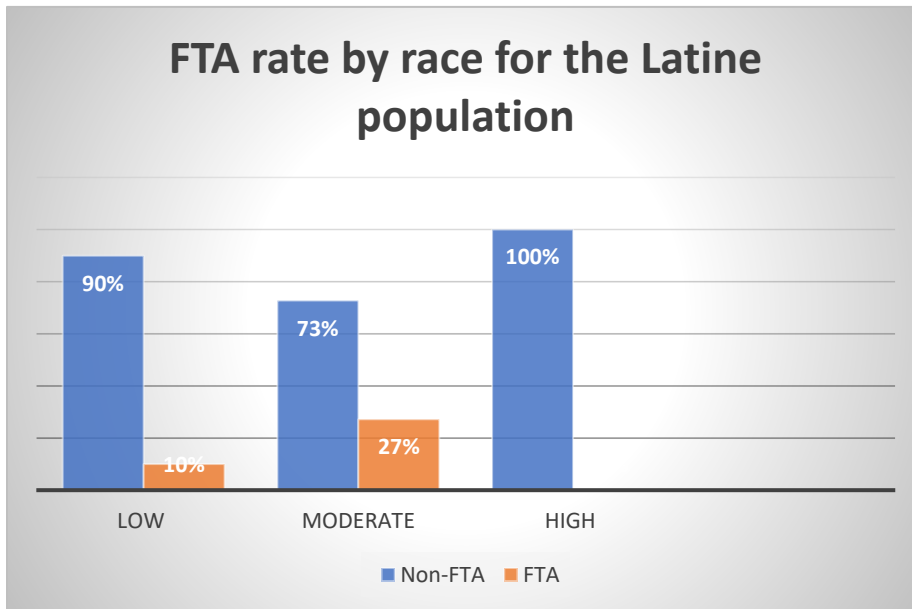
Figure 16: FTA rate by risk level for the Black population n=80



In Figure 16, the FTA rate distribution for individuals who are Black increased by risk level. The AUC score is .6976 suggesting that it is moderate effect to predict FTA rates by risk level for individuals who are Black.

AUC score=.6976

Figure 17: FTA rate by risk level for the Latine population n=48



The FTA rates for the Latine population only steadily increase for moderate and do not increase for high-risk level individuals. The AUC score of .5092 also indicates the risk levels for the Latine population are no better than random chance at predicting FTA. There was a statistical difference in AUC scores between white and Latine as well as

Black and Latine population. This indicates that ORAS-PAT may not predict FTA as strongly for Latine people than for white and Black people.

AUC score=.5092

Figure 18: FTA rate by risk level for the Asian population n=17

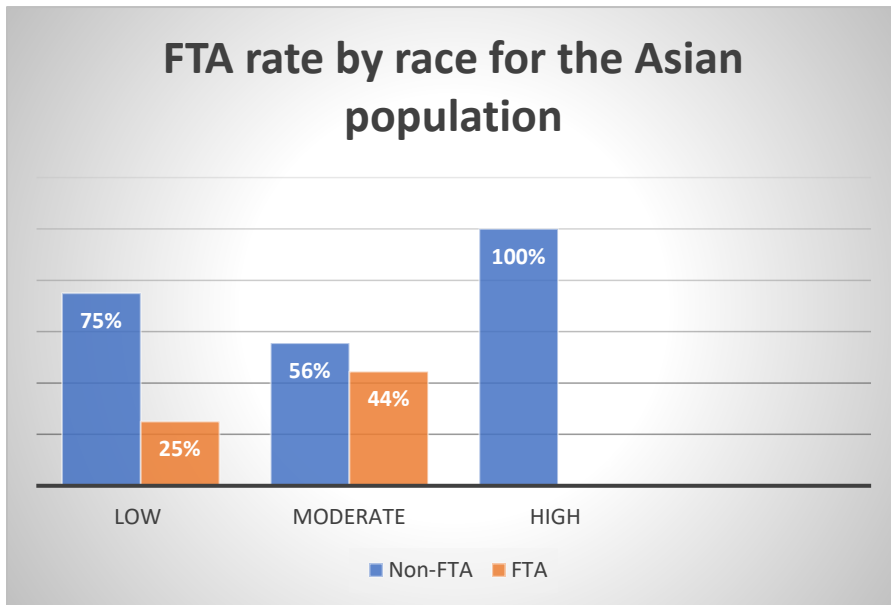
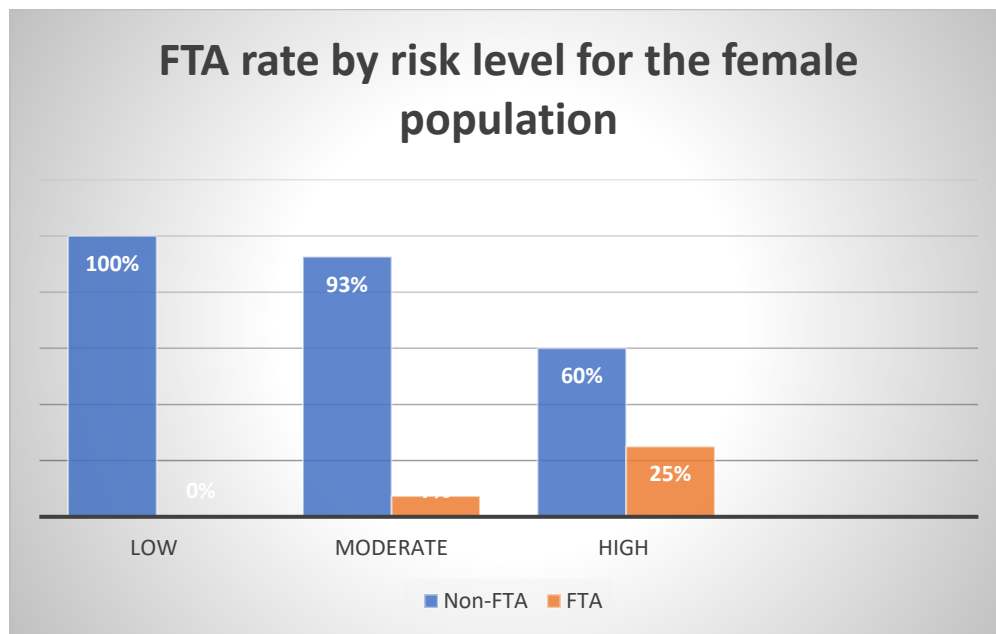


Figure 18 illustrates that FTA rates did not uniformly increase as risk levels increased. The AUC score of .3917 suggest that FTA prediction for the Asian population is not better at predicting than by chance. There was a statistical difference in AUC scores between white and Asian people as well as Black and Asian people but not statistically significant difference with Asian and

Latine people. This indicates that ORAS-PAT may not predict FTA as strongly for Asian people than for white and Black people.

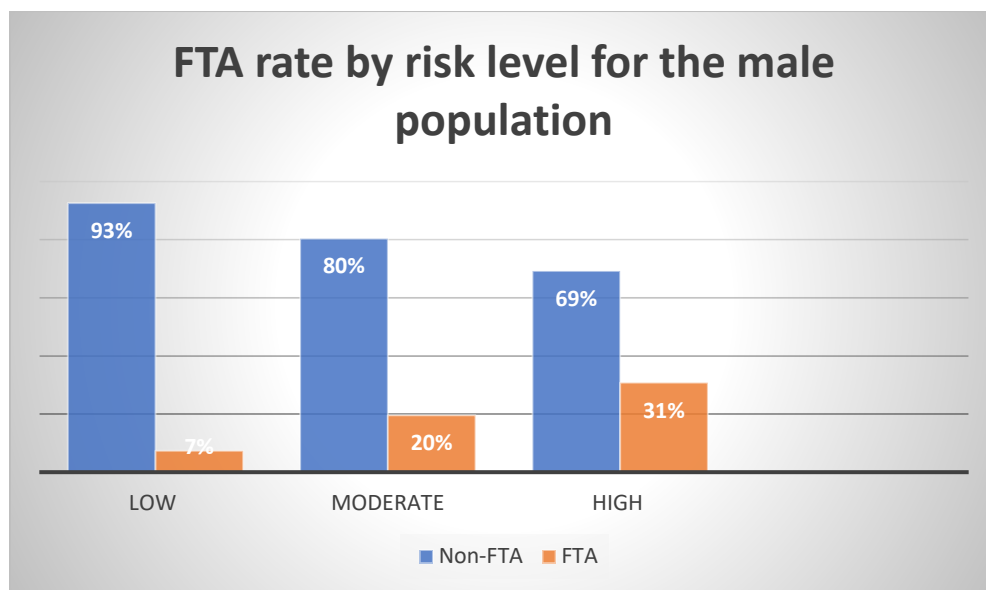
AUC score=.3917

Figure 19: FTA rate by risk level for the female population n=43



AUC score=.7026

Figure 20: FTA rate by risk level for the male population n=155



AUC score=.6061

Figures 19 and 20 illustrate the FTA rates by risk level for females (n=43) and males (n=155). For both females and males, the FTA rate increased as risk levels increased. In addition, the AUC score for females is .7026 a strong predictive effect, while for males, it is .6061, a medium predictive effect. There was no statistical difference between females and males, suggesting no predictive bias in terms of gender.

The previous models examined predictive bias and the prediction of the likelihood of FTA. It is also essential to test disparate impact across racial, ethnic, and gender groups. Drawing from (Skeem & Lowenkamp, 2016; Barno, Williams, & Nevárez Martínez, 2019), disparate impact is measured by the difference in means scores of risks. A statistical difference in mean scores could potentially impact more restrictive conditions on pretrial release. There were no statistical differences in mean scores between males and females for the population released under pretrial supervision. There were no statistical differences in mean scores for white, Black, Asian, or Native American people released on pretrial supervision. The results in Table 22 showed that risk scores given to Latine statistically differ $t(97) = 1.9925, p=.0491$ compared to the white population. There was a statistical difference in mean scores for Latine people compared to white individuals. The score for Latine is lower for those released which might suggest that the Latine population is released with a mean score of three while others have higher risk scores who are released. Further analysis needs to take place to assess the reason for the difference in mean score.

Testing for disparate impact should also include the entire population assessed. Table 23 illustrates the mean score of risk for race, ethnicity, and gender comparison. In Table 23, all individuals, including those denied released, are included. It was observed that the mean risk scores for all assessed compared to those released are slightly higher. Black individuals, Asians, Native Americans, white or other did not have a statistical difference for the mean score. An independent t-test was run on a sample of 281 individuals to determine if there were differences in risk scores

for Latine and white individuals. The results showed that risk scores were given to Latine statistically differ $t(279) = 2.8251, p=.0051$ for all assessed populations meaning there could be disparate impact.

Table 22: Disparate impact: risk scores on those released under pretrial supervision (n=198)

Mean Risk Scores								
	Males (n=155)	Females (n=43)	White (n=51)	Black (n=80)	Latine (n=48)	Asian (n=17)	Native American (1)	Other (n=1)
Mean Risk Score	4.0645	4.4651	4.4705	4.2625	3.75	4	4	1

The mean scores were statistically different for white and Latine mean score ($p < 0.05$).

Table 23: Disparate impact: mean risk regardless of pretrial release (n=558)

Mean Risk Scores								
	Males (458)	Females (n=100)	White (n=164)	Black (n=239)	Latine (n=117)	Asian (n=29)	Native American (n=1)	Other (n=8)
Mean Risk Score	4.51	4.73	4.90	4.52	4.15	4.69	4	3.5

The mean scores were statistically different for white and Latine mean score ($p < 0.05$).

Discussion

Overall, the FTA rates increase as ORAS-PAT risk level increase, and these increases are statistically significant. Indicating that the increases in FTA rate are not by chance; the risk level does predict FTA. At the same time, the predictability of the ORAS-PAT risk score is not statistically significant. The findings suggest that the total score can be adjusted to predict the Solano population accurately. The FTA rates are ununiformed. The logistic regression model predicting the likelihood of FTA, and total revocations were consistent that risk score was statistically significant at predicting FTA or total revocation but not a new arrest. Although the covariates of race and gender do not seem to predict FTA, arrest, or revocations, suggesting no racial bias, when the strength of ORAS-PAT was examined on FTA rates by subgroups, the prediction for Latine and Asian individuals is less in comparison to white and Black individuals. The predictive strength varied for Latine and Asian individuals. The difference in strength may be due to the high-risk category is lower than expected for high-risk level individuals who are Asian or Latine. Testing individual items of the tool will allow a better explanation of why there is a difference in prediction strength. At this moment, Probation is unable to retrieve that data due to a change in their data management system. What can be concluded is that the risk levels do not accurately predict for Latine and Asian populations, not because they are a higher FTA rate but because they have a lower FTA rate for high-risk levels. There was no gender bias, and the tool predicted a slight increase in FTA rates as risk levels increased by gender.

Conclusion

In conclusion, the ORAS-PAT in Solano County demonstrates to be statistically significant at predicting FTA by risk level but not risk score. For the 2019 data, the strength of risk level in predicting FTA rates was low for Black and Latine individuals compared to white individuals. However, the 2020 data demonstrated a moderate predictive strength in risk levels across the white and Black populations but not for the Latine or Asian populations. The study also examined potential gender bias. Based on the findings, there was no statistical difference to determine gender bias on either 2019 or 2020 data. Lastly, the study examined disparate impact based on the average mean score by race and ethnicity. For the 2020 data, the disparate impact findings suggest a statistical difference between the mean risk score for Latine compared to white individuals, which suggests that a closer look at the model needs to be considered for those differences. Those differences might be due to how different groups score for individual items in the ORAS-PAT; however, that data was unavailable.

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