DIFFERENCES IN THE PREDICTIVE ACCURACY OF IRAS-PAT ASSESSMENTS AS A FUNCTION OF AGE, SEX, AND RACE: FINAL REPORT

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EXECUTIVE SUMMARY

In 2015, the Indiana Office of Court Services entered into an agreement with 11 Indiana counties to pilot the Indiana Risk Assessment System – Pretrial Assessment Tool (IRAS-PAT) in local pretrial decision-making processes. To date, evaluation of this initiative suggests that the tool was successfully implemented into local decision-making (Grommon et al., 2017) and that assessments produced by the IRAS-PAT predict key pretrial misconduct outcomes with good-to-excellent accuracy (Lowder, Lawson, et al., 2020).

The purpose of the present investigation was to further study predictive accuracy of IRAS-PAT assessments as a function of demographic characteristics: age, sex, and race. We pooled data from five local validations (Allen, Hamilton, Hendricks, Jefferson, and Monroe counties) to examine evidence of predictive bias between adults aged 33 and older versus those under 33, male and female defendants, and Black and White defendants. Where we found evidence of predictive bias, we conducted an in-depth investigation to examine item-level drivers of disparate predictive accuracy. The sample included 3,539 defendants across five jurisdictions.

Summary of Findings

Overall, we found no evidence of predictive bias in IRAS-PAT assessments as a function of age or sex. IRAS-PAT assessments predicted outcomes with comparable accuracy across age groups and for both male and female defendants. Any deviations in predictive accuracy were small and inconsistent across pretrial misconduct outcomes.

In contrast, we found notable and consistent evidence of predictive bias in IRAS-PAT assessments as a function of race. The IRAS-PAT produced weaker predictive validity estimates for Black defendants relative to White defendants across all pretrial misconduct outcomes, but most notably for any FTA and any arrest. For all outcomes, Black defendants classified at High risk had lower rates of pretrial misconduct relative to White defendants classified at High risk, whereas the opposite trend was true for defendants classified at Low risk. Importantly, IRAS-PAT assessments were fair predictors of pretrial misconduct risk for Black defendants, but predictive validity estimates overall were lower for this group.

Item-level analysis suggested that predictive bias was driven by differences in the predictive utility of individual IRAS-PAT items for Black and White defendants. These differences were robust to several corrections to create more equivalent groups, including creating similar sample sizes for both Black and White defendants and matching Black and White defendants on several legal and extralegal characteristics. Item 3 (Criminal History) and Item 5 (Residential Instability) were among the most disparate predictors of pretrial misconduct outcomes between Black and White defendants.

Conclusions

Overall, our findings show comparable predictive accuracy of IRAS-PAT assessments by age and sex. However, there were meaningful differences in predictive accuracy as a function of defendant race. Importantly, these findings do not suggest that the IRAS-PAT does not have

predictive utility for Black defendants. Instead, IRAS-PAT assessments showed fair predictive utility for Black defendants. Item-level findings suggest IRAS-PAT items function differently for Black and White defendants, independent of any differences in the legal or extralegal characteristics of these groups.

Given the five-county focus of this investigation, generalizability of findings to the statewide pretrial population is limited and may justify future replication with a more representative sample of Indiana pretrial defendants. Additionally, future investigation may explore other measures, beyond those included in the IRAS-PAT, that may mitigate predictive bias in pretrial assessments.

Overall, the IRAS-PAT is performing well for the majority of pretrial defendants. These findings highlight important tradeoffs between maximizing predictive accuracy and balancing fairness considerations between different demographic groups.

INTRODUCTION

Determining whether to release a newly arrested defendant into the community is one of the most critical decisions during the pretrial period. Pretrial decision-making involves multiple justice system professionals making timely choices throughout the process. Front-end system decision-making has implications for subsequent outcomes. 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 (Stevenson & Mayson, 2017). Incarceration can also disrupt housing, employment, family relationships, and ties to the community (Stevenson & Mayson, 2017). The use of actuarial risk assessments during the pretrial period has emerged as one strategy to reduce pretrial detention rates, achieve equitable non-monetary conditions of release, and minimize racial and socioeconomic disparities in release and detention decisions. The integration of these assessment tools comes at a time when communities across the United States have recognized the importance of advancing pretrial practice and policy, resulting in a national movement for pretrial and bail reform efforts.

Despite the potential of these tools to predict future pretrial misconduct (Bechtel et al., 2017; Desmarais et al., 2020; Lowder et al., 2020), pretrial risk assessment tools are not without controversy. There remain serious concerns about the potential for risk assessments to exacerbate racial and ethnic disparities in criminal justice processing (Pretrial Justice Institute, 2020). Specifically, some scholars have argued that items included in risk assessments reflect the relative disadvantage of minority defendants and, as a result, bias those defendants toward higher risk classifications (Harcourt, 2015; Starr, 2014). There have been a limited but growing number of investigations into racial and ethnic disparities in the use of risk assessments during pretrial decision-making. Risk assessment validation studies have shown evidence of lower predictive accuracy of assessments for racial and ethnic minorities (Fass et al., 2008), attributable to racial disparities in socioeconomic characteristics and criminal history, content domains that are frequently embedded within risk assessment tools (Zettler & Morris, 2015). However, some research suggests that risk can be estimated free of bias (Baglivia et al., 2019; Flores et al., 2016), particularly when assessments measure factors that protect against future misconduct (Lowder et al., 2019). Overall, there has been a lack of consistent findings on predictive accuracy of pretrial risk assessments in criminal justice settings for racial and ethnic minorities (see, e.g., Cohen & Lowenkamp, 2019; Copp et al., 2019; DeMichele & Baumgartner, 2020).

Previously, the Indiana Supreme Court established the Committee to Study Evidence-Based Pretrial Release in 2014, which developed an evidence-based pretrial program to evaluate the implementation of the Indiana Risk Assessment System – Pretrial Assessment Tool (IRAS-PAT). Guided by the National Institute of Corrections' Evidence Based Decision Making (EBDM) Framework, 11 counties in 2015 entered into an agreement with the Indiana Office of Court Services (IOCS) to develop and implement their own pretrial pilot project aimed at maximizing public safety, court appearance, and pretrial release; IRAS-PAT assessments being at the core of these local pretrial justice reform efforts. Researchers from the Indiana University Public Policy Institute, Center for Criminal Justice Research (CCJR) conducted a process evaluation of pilot counties to understand how the IRAS-PAT was adopted by participating pilot counties and to identify barriers and facilitators of implementation (Grommon et al., 2017).

The original research team has expanded and evolved over the years, and our focus shifted from evaluating the implementation of the IRAS-PAT to providing county-level validation of the tool. As part of the pilot implementation of the IRAS-PAT, our research team is in the process of conducting county-level validations of IRAS-PAT assessments implemented in practice. Six of these validations (Monroe, Hamilton, Allen, Jefferson, Hendricks, and Bartholomew) have been completed and another is in progress (Porter). These county-level validations have provided useful insight into the predictive accuracy of IRAS-PAT assessments. Our local validation approach found strong predictive accuracy of IRAS-PAT assessments, with estimates meeting or exceeding standards for the performance of risk assessment tools in a justice system context (Lowder et al., 2020).

However, their limited sample size has not allowed for rigorous investigation into differences in the predictive accuracy as a function of race at the county level. The ability of pretrial risk assessment tools to predict outcomes with similar accuracy between Black and White defendants, in particular, has emerged as a key concern in pretrial reform efforts. Thus, the current inquiry moves to the third stage of research on Indiana's pretrial pilot project. This phase investigates the predictive bias of IRAS-PAT assessments by race. In other words, we examine whether assessments are stronger predictors of pretrial misconduct outcomes for White defendants relative to Black defendants. When there is bias, this bias is typically found at higher risk levels, where Black defendants tend to be over-classified relative to their risk of misconduct. We further assessed the predictive bias of IRAS-PAT assessments on the basis of sex and age.

To better understand how the IRAS-PAT functions across defendant characteristics, we created a pooled dataset of validation data from five pilot counties to examine the predictive bias of IRAS-PAT assessments. This multi-jurisdictional, pooled dataset includes 3,539 pretrial defendants who received a risk assessment, had court charges filed, and spent time in the community prior to court case disposition. All counties began using the IRAS-PAT in 2016, which marked the start of the 1-year study period for each jurisdiction. The follow-up period for each defendant was defined by the pretrial processing period (i.e., the date of index jail release to the date of court disposition). The objective of this report is to conduct a rigorous test of the predictive bias of IRAS-PAT assessments across five Indiana counties, with a focus on the extent to which the IRAS-PAT provided accurate predictions on the basis of race, sex, and age.

METHODS

Data Sources

Data for this investigation were drawn from validation data from five pilot counties (Monroe, Hamilton, Allen, Jefferson, and Hendricks). For each validation, data sources included jail, court, and risk assessment records. First, for each county, we received county level jail data on all admissions, associated release dates, and booking charge(s). For four of five counties, court data were drawn from Indiana's statewide court case management system, Odyssey. For the fifth county, court records were drawn from a local records management system. For both sources, court data contained information on all criminal cases and case-related information (e.g., hearings, case disposition, warrants, and FTAs) processed in each county. Finally, we received risk assessment records from the Indiana Court Information Technology Extranet (INcite) system, which included assessment date, total score, and item-level data.

Sample

The sample comprised of 3,539 defendants who were primarily White (*n* = 2,850, 80.5%) versus Black (*n* = 689, 19.5%) and mostly male (*n* = 2,522, 71.3%). Defendants identifying with other racial groups were removed from analysis. A large proportion of defendants were ages under 33 (*n* = 2,031, 57.4%), with an average age of 32.8 years old (*SD* = 11.73, Range: 16 to 82).

Variables

IRAS-PAT. The IRAS-PAT is an actuarial assessment designed to predict risk of arrest and FTA during the pretrial period. The IRAS-PAT is a 7-item instrument measuring 1) age at first arrest, 2) number of FTA warrants in the past 24 months, 3) three or more prior jail incarcerations, 4) employment at the time of arrest, 5) residential stability, 6) illegal drug use in the past six months, and 7) a severe drug use problem. Items 1, 3, 5, 6, and 7 are scored dichotomously (i.e., 0 or 1) and items 2 and 4 are scored on a 0-2 point scale, producing a maximum total score of 9. Total scores classify defendants into three risk levels: Low (0-2), Moderate (3-5), and High (6+). Our investigation used IRAS-PAT *total scores*, *risk levels*, and *items*. Note, four individuals did not have item-level data and were excluded from item-level analyses.

Pretrial Misconduct Outcomes. Outcomes included *any FTA* (yes; no), *any new arrest* (yes; no), and *any arrest* (yes; no) occurring during the pretrial processing period (i.e., following initial release from jail but prior to court case disposition). Any FTA measured failure to appear at any court appearance during case processing, which were primarily recorded using court records. In some jurisdictions, few FTAs were recorded with accompanying event dates in court records. For these counties, we captured FTAs using triangulated jail booking and court warrant records. Specifically, we matched booking records for an FTA charge to service dates for a warrant record in court records. This process allowed us to establish an issued date for the FTA warrant and link it to a specific court case. Any new arrest measured a new booking occurring during the pretrial period in which a detainee was booked on any new offense charge. Any arrest measured any booking occurring during the pretrial period.

Demographic Characteristics. Demographic variables included *race* (Black; White), *sex* (female; male), and *age* (under 33; 33 and older).

Covariates. Covariates included *county* (dummy coded, with County 1 as the reference group) and *time at risk*, which measured the total number of days from the date of pretrial release to the date of court case disposition, minus any time incarcerated in the local jail.

Analytic Strategy

We first conducted descriptive statistics on all study variables overall and by demographic characteristics. Second, we conducted bivariable statistics to test hypotheses of mean and proportional differences between IRAS-PAT total scores, risk levels, and pretrial misconduct outcomes across each group. We report the associated effect size estimates in text (i.e., Cramer's V, Cohen's d). Cramer's V estimates of 0.10, 0.30, and 0.50 represent small, medium, and large effect sizes, respectively (Cohen, 1988). In terms of d, Cohen (1988) suggested corresponding estimates of 0.20, 0.50, and 0.80 indicate small, medium, and large effect sizes, respectively.

To examine the predictive bias of IRAS-PAT assessments by demographic characteristics, we used a multi-pronged approach. First, we examined the Area Under the Curve (AUC) of the Receiving Operating Characteristic (ROC) statistics across each group. AUC values are commonly used to evaluate the predictive accuracy of risk assessment total scores. AUC values range from .50 to 1, with .50 indicating chance levels of classification and 1 suggesting perfect classification. AUC values below .54 are typically considered poor, .55 to .63 fair, .64 to .70 good, and .71 and above excellent. These conventions 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 (Desmarais & Singh, 2013).

Second, we conducted a series of logistic regression analyses to examine the predictive accuracy of IRAS-PAT assessments for each pretrial misconduct outcome, controlling for county and time at risk. For reference, odds ratios of 1.50, 3.00, and 5.00 indicate small, medium, and large effect sizes, respectively (Chen et al., 2010). Significant effects of interest are shaded in grey. To rigorously test for predictive accuracy of IRAS-PAT assessments by demographic characteristics, we tested for evidence of interaction effect(s) between the demographic characteristic and IRAS-PAT total scores, risk levels, and items. We employed hierarchical logistic regression models to test for improvement in model fit between a main-effects only model (e.g., race and IRAS-PAT scores as independent predictors) (Block 1) and a second model with added interaction terms (e.g., race by IRAS-PAT score) (Block 2). Hierarchical models are useful when researchers are interested in testing how addition of a model term, such as an interaction effect between two variables, improves the overall ability of the model to predict an outcome. In unweighted models, we used change in -2 log likelihood statistics to assess for improvement in model fit between Block 1 and Block 2. We also present decomposed interactions (i.e., predicted probabilities and associated 95% confidence intervals).

In the race specific analyses, we conducted two additional sets of analyses to address specific criticisms that item-level results would be due to 1) baseline differences between groups or 2) unequal sample sizes between groups, given the small number of Black defendants in the sample. First, to adjust for baseline differences between groups, we conducted propensity score matching using MatchIt in R and specifying a full matching procedure (Ho et al., 2011; Stuart & Green, 2008). Propensity scores measure the probability that a given individual will belong to a specific group (e.g., Black or White defendant) given known characteristics of that individual. For the purposes of this analysis, we matched White defendants to Black defendants based on county, age, gender, IRAS-PAT total score, time in the community, highest charge level, and charge types. Charge types were selected based on prevalence in the overall sample (i.e., $\geq$ 10% of defendants). Weights generated from the propensity score matching procedure were then used in multivariable models (i.e., weighted models). Second, to address criticisms that item-level findings would reflect unequal sample sizes between White and Black defendants, we developed a stratified sample of White defendants. This process involved collecting a random sample of White defendants from each of the individual county samples based on the number of Black defendants from each original county sample. The stratified sample shows whether the item-level results are independent of sample size differences between Black and White defendants.

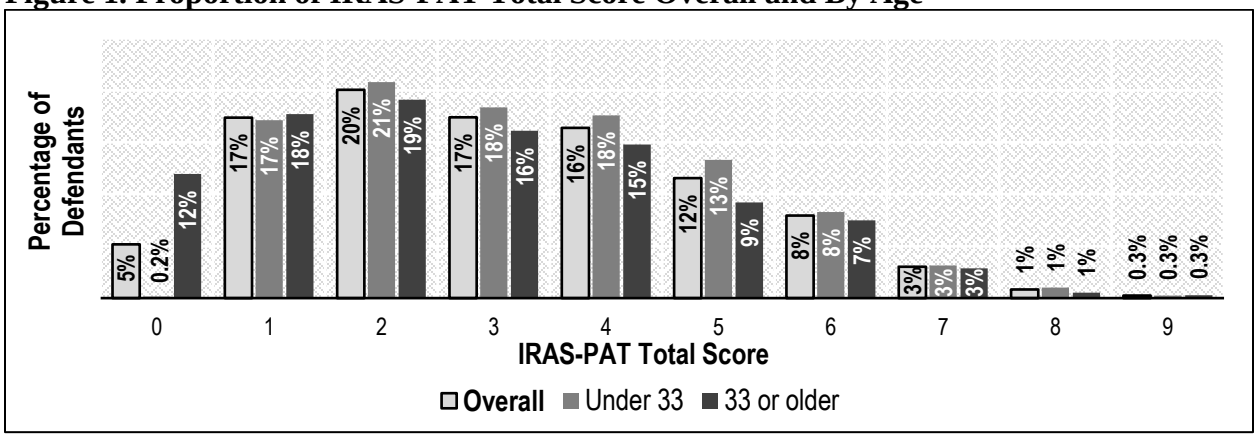
FINDINGS

Predictive Validity of IRAS-PAT Assessments by Age

Descriptives

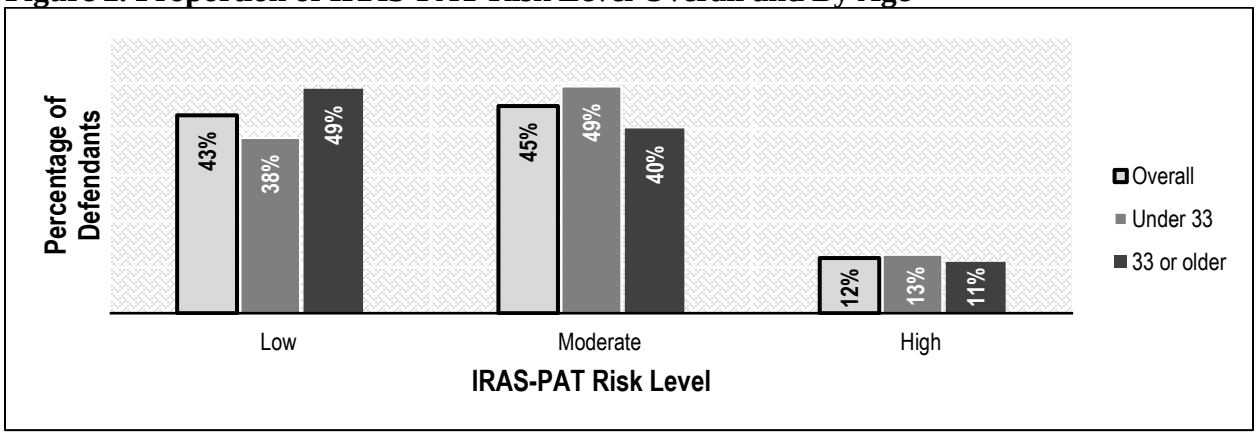
IRAS-PAT. IRAS-PAT scores averaged 3.33 (*SD* = 1.76, Range: 0 to 9) for defendants ages under 33 and 2.81 (*SD* = 1.95, Range: 0 to 9) for defendants 33 or older. Defendants ages under 33 had significantly higher IRAS-PAT scores relative to defendants who were 33 or older (t[3,051.07] = -8.12, $p < .001$, Cohen's d = -0.28). The frequency distribution of IRAS-PAT scores by age is presented in Figure 1.

Figure 1. Proportion of IRAS-PAT Total Score Overall and By Age



The larger proportion of defendants ages under 33 classified at High risk relative to defendants ages 33 or older is also depicted in Figure 2. As shown, one out of every two defendants ages under 33 were classified as Moderate risk (n = 1,000) with fewer being classified as Low risk (n = 773). This trend, however, was not observed among defendants who were ages 33 or older. Indeed, one out of every two defendants ages 33 or older were classified as Low risk (n = 735) with fewer being classified as Moderate risk (n = 605). Both groups had similar rates of being classified as High risk.

Figure 2. Proportion of IRAS-PAT Risk Level Overall and By Age

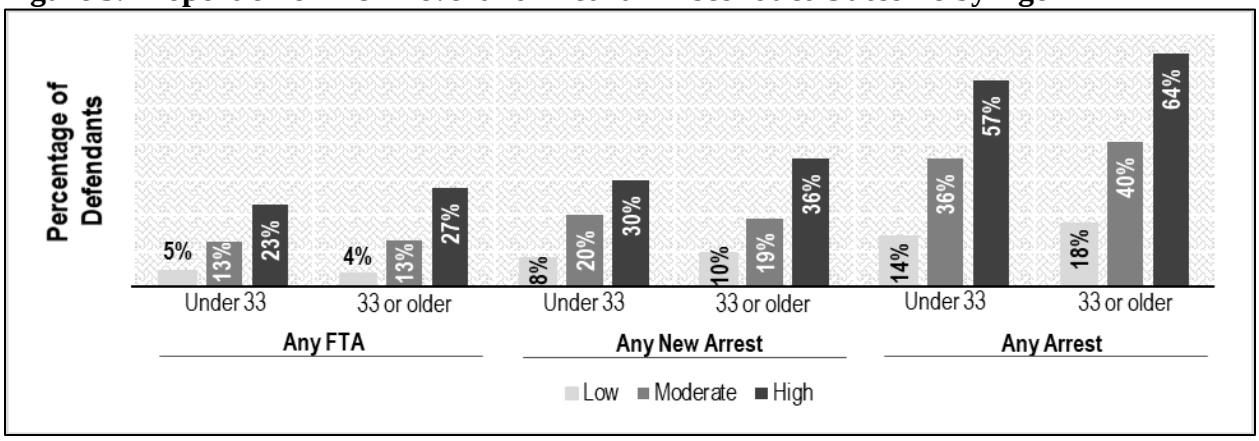


Pretrial Misconduct Outcomes. Defendants ages under 33 and defendants who were 33 or older did not diverge significantly from one another on pretrial misconduct outcomes. Following jail release, but prior to case disposition, 11.0% of defendants ages under 33 had any failure to appear for any court hearing (*n* = 224), and 16.7% had at least one new arrest (*n* = 339). One-third of defendants ages under 33 had any arrest prior to case disposition (30.2%, *n* = 613). Similar rates of any FTA (*n* = 156, 10.3%), any new arrest (*n* = 246, 16.3%), and any arrest (*n* = 481, 31.9%) were observed among defendants ages 33 or older.

Frequency Distributions of Risk Level and Pretrial Misconduct Outcomes by Age

Figure 3 presents the frequency distribution of IRAS-PAT risk level and pretrial outcomes stratified by age. As shown, defendants ages under 33 and 33 or older had, on average, similar rates of pretrial misconduct at each risk level. Both groups had higher proportions of any arrest at each risk level relative to other pretrial misconduct outcomes. See Appendix Table 1A for crosstabulations of risk level and pretrial misconduct outcomes by age.

Figure 3. Proportion of Risk Level and Pretrial Misconduct Outcome by Age



Predictive Accuracy Analyses

AUC of the ROC. In Table 1, we present AUC values and their associated conventions separately by age and outcome. As shown, IRAS-PAT assessments produced similar predictive accuracy estimates overall for both groups, with a slight difference in any FTA. This difference, however, was not statistically significant.

Table 1. AUC Values by Pretrial Misconduct Outcome and Age

Pretrial Outcomes	Under 33 *n* = 2,031			33 or older *n* =1,508		
	AUC (SE)	95% CI	Convention	AUC (SE)	95% CI	Convention
Any FTA	0.68 (0.02)	[0.65, 0.72]	Good	0.73 (0.02)	[0.69, 0.77]	Excellent
Any New Arrest	0.67 (0.02)	[0.64, 0.70]	Good	0.67 (0.02)	[0.64, 0.71]	Good
Any Arrest	0.71 (0.01)	[0.69, 0.74]	Excellent	0.71 (0.01)	[0.69, 0.74]	Excellent

Logistic Regression Models. Table 2 presents results of a series of unweighted logistic regression analyses of IRAS-PAT total scores and age modeling pretrial misconduct outcomes while controlling for county and time at risk. After conducting a main-effects only model, we examined whether age moderated the effect of total score on pretrial misconduct outcomes in Block 2. Together, the addition of these interactions did not contribute to a significant improvement in model fit over Block 1, *p*s ≥ .489. The age by total score interaction effects were not statistically significant in any of the pretrial misconduct models, *p*s ≥ .489.

Table 2. Unweighted Logistic Regression Models of IRAS-PAT Total Scores and Age Predicting Pretrial Misconduct

Predictor	Unweighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Total Score	1.47	[1.38, 1.57]	<.001	1.40	[1.33, 1.48]	<.001	1.55	[1.48, 1.63]	<.001
Under 33 (33 or older)	1.05	[0.83, 1.33]	.687	0.97	[0.80, 1.18]	.789	0.78	[0.66, 0.91]	.002
Time at Risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	0.97	[0.65, 1.46]	.887	0.28	[0.21, 0.37]	<.001	0.84	[0.66, 1.05]	.130
County 3	0.86	[0.56, 1.33]	.506	0.24	[0.17, 0.33]	<.001	0.57	[0.44, 0.73]	<.001
County 4	1.83	[1.19, 2.80]	.006	0.96	[0.72, 1.29]	.806	0.85	[0.64, 1.13]	.271
County 5	1.68	[1.15, 2.45]	.007	0.41	[0.32, 0.54]	<.001	0.57	[0.45, 0.72]	<.001
Block 2									
Under 33 X Total Score	0.96	[0.85, 1.09]	.556	1.03	[0.93, 1.14]	.543	1.03	[0.94, 1.13]	.489
Δ-2LL		0.35 (1)			0.37 (1)			0.48 (1)	

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. Δ-2LL reflects improvement in model fit upon addition of the interaction term(s) in Block 2. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio.

As shown in Table 3, we examined whether age moderated the effect of risk level on pretrial misconduct outcomes. Together, the addition of these interactions in Block 2 did not contribute to a significant improvement in model fit over the main-effects only model (i.e., Block 1), *p*s ≥ .479. The age by risk level interaction effects were not statistically significant in any of the pretrial misconduct models, *p*s ≥ .335.

Table 3. Unweighted Logistic Regression Models of IRAS-PAT Risk Levels and Age Predicting Pretrial Misconduct

Predictor	Unweighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Risk Level (Low)									
Moderate	3.00	[2.23, 4.04]	<.001	2.59	[2.07, 3.24]	<.001	3.12	[2.61, 3.73]	<.001
High	6.96	[4.91, 9.88]	<.001	5.36	[4.03, 7.13]	<.001	8.44	[6.58, 10.84]	<.001
Under 33 (33 or older)	1.08	[0.86, 1.37]	.508	1.01	[0.84, 1.23]	.894	0.83	[0.71, 0.97]	.023
Time at Risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	1.01	[0.67, 1.51]	.969	0.28	[0.21, 0.38]	<.001	0.84	[0.67, 1.06]	.147
County 3	0.90	[0.59, 1.39]	.645	0.25	[0.18, 0.35]	<.001	0.60	[0.47, 0.78]	<.001
County 4	1.95	[1.27, 2.99]	.002	1.02	[0.76, 1.36]	.904	0.92	[0.70, 1.22]	.562
County 5	1.79	[1.23, 2.61]	.002	0.44	[0.34, 0.57]	<.001	0.60	[0.48, 0.76]	<.001
Block 2									
Under 33 X Moderate	0.92	[0.51, 1.68]	.792	1.25	[0.80, 1.95]	.335	0.97	[0.68, 1.38]	.867
Under 33 X High	0.79	[0.39, 1.60]	.518	0.97	[0.55, 1.70]	.902	0.92	[0.56, 1.51]	.729
∆-2LL		0.45 (2)			1.47 (2)			0.12 (2)	

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. ∆-2LL reflects improvement in model fit upon addition of the interaction term(s) in Block 2. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio.

Summary of Age Findings

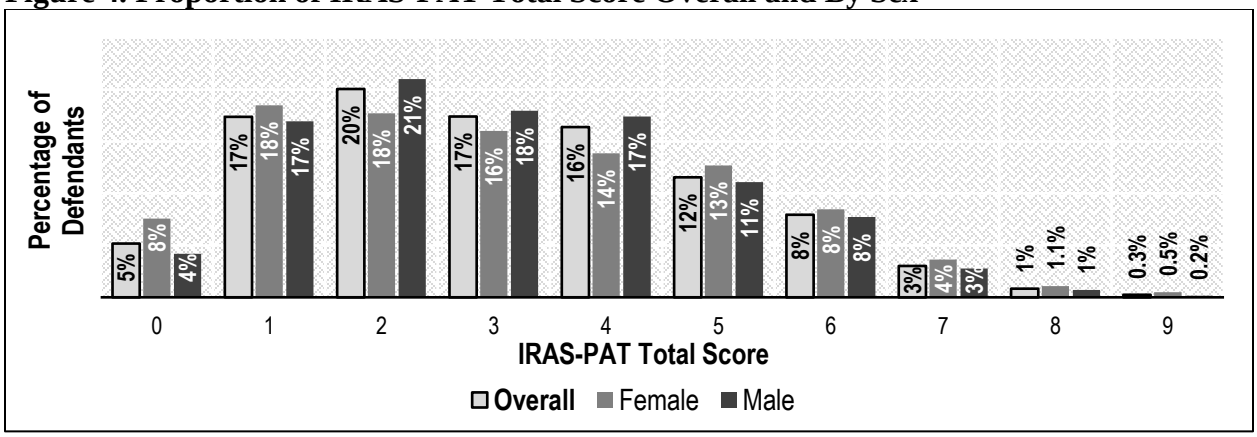
Together these results provide evidence that IRAS-PAT assessments produce similar predictive accuracy for defendants ages under 33 and 33 or older. There were no substantive differences in misconduct rates between both groups assessed at each risk level.

Predictive Validity of IRAS-PAT Assessments by Sex

Descriptives

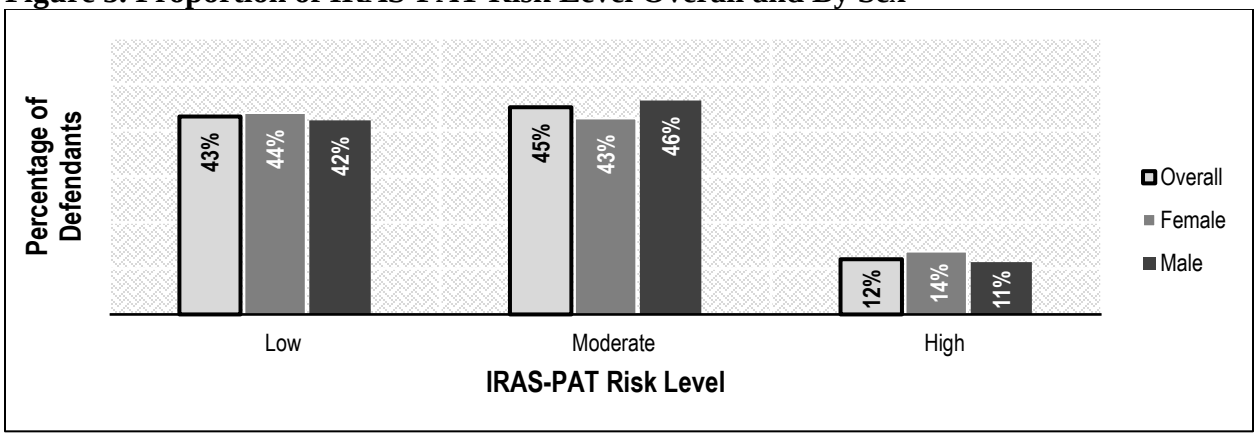
IRAS-PAT. IRAS-PAT scores averaged 3.10 (*SD* = 2.01, Range: 0 to 9) for female defendants and 3.11 (*SD* = 1.80, Range: 0 to 9) for male defendants. There is no significant difference between female and male defendants' IRAS-PAT total scores (t[1711.35] = 0.11, p = .910, Cohen's d = 0.004). The frequency distribution of IRAS-PAT scores by race is presented in Figure 4.

Figure 4. Proportion of IRAS-PAT Total Score Overall and By Sex



As shown in Figure 5, female and male defendants had on average similar rates of IRAS-PAT risk levels.

Figure 5. Proportion of IRAS-PAT Risk Level Overall and By Sex

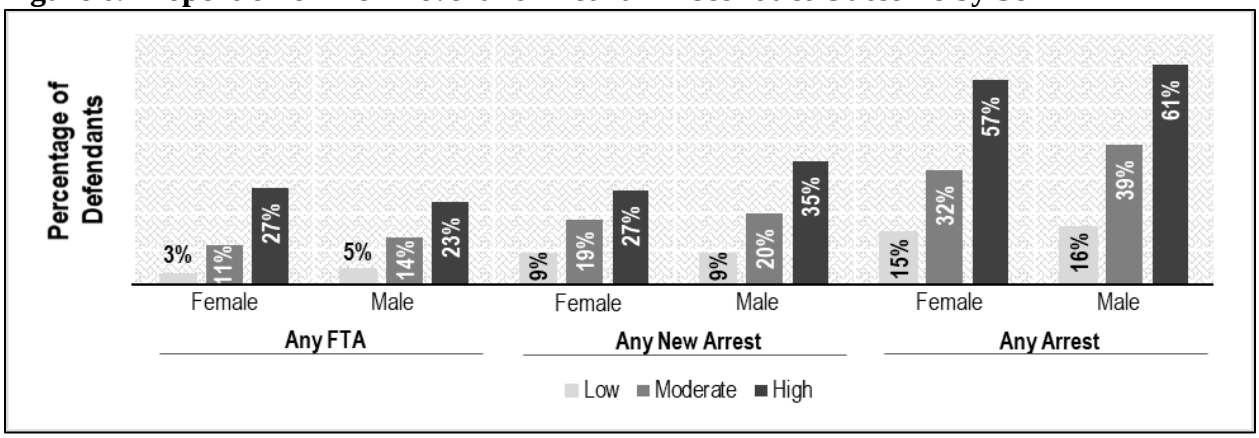


Pretrial Misconduct Outcomes. Female and male defendants diverged significantly from one another on any arrest. Female defendants were found to possess significantly lower proportions of any arrest (n = 285, 28.0%) compared to male defendants (n = 809, 32.1%), $\chi^2(1) = 5.58$, p = .018, Cramer's V = -0.04. However, there were no significant differences between female and male defendants for any new arrest (n = 157, 15.4% and n = 428, 17.0%, respectively) and any FTA (n = 103, 10.1% and n = 277, 11.0%, respectively).

Frequency Distributions of Risk Level and Pretrial Misconduct Outcomes by Sex

Figure 6 presents the frequency distribution of IRAS-PAT risk level and pretrial outcomes stratified by sex. As shown, female and male defendants had, on average, similar rates of pretrial misconduct at each risk level, with the exception of the rate of any new arrest for defendants classified as High risk. Female defendants classified as High risk had a lower proportion of any new arrest relative to male defendants at High risk level. See Appendix Table 2A for crosstabulations of risk level and pretrial misconduct outcomes by sex.

Figure 6. Proportion of Risk Level and Pretrial Misconduct Outcome by Sex



Predictive Accuracy Analyses

AUC of the ROC. In Table 4, we present AUC values and their associated conventions separately by sex and outcome. As shown, IRAS-PAT assessments produced similar predictive accuracy estimates overall for female and male defendants, with a slight difference in any FTA. This difference, however, was not statistically significant.

Table 4. AUC Values by Pretrial Misconduct Outcome and Sex

Pretrial Outcomes	Female *n* = 1,017			Male *n* =2,522		
	AUC (SE)	95% CI	Convention	AUC (SE)	95% CI	Convention
Any FTA	0.73 (0.02)	[0.69, 0.78]	Excellent	0.69 (0.02)	[0.66, 0.72]	Good
Any New Arrest	0.66 (0.02)	[0.61, 0.70]	Good	0.67 (0.01)	[0.65, 0.70]	Good
Any Arrest	0.72 (0.02)	[0.68, 0.75]	Excellent	0.71 (0.01)	[0.69, 0.73]	Excellent

Logistic Regression Models. Table 5 presents results of a series of unweighted logistic regression analyses of IRAS-PAT total scores and sex modeling pretrial misconduct outcomes while controlling for county and time at risk. After conducting a main-effects only model, we examined whether sex moderated the effect of total score on pretrial misconduct outcomes in Block 2. Together, the addition of these interactions did not contribute to a significant improvement in model fit over Block 1, *p*s ≥ .166. The sex by total score interaction effects were not statistically significant in any of the pretrial misconduct models, *p*s ≥ .165.

Table 5. Unweighted Logistic Regression Models of IRAS-PAT Total Scores and Sex Predicting Pretrial Misconduct

Predictor	Unweighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Total Score	1.48	[1.39, 1.57]	<.001	1.40	[1.33, 1.48]	<.001	1.54	[1.48, 1.62]	<.001
Female (Male)	0.84	[0.65, 1.09]	.190	0.87	[0.70, 1.07]	.179	0.77	[0.65, 0.92]	.004
Time at Risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	0.98	[0.65, 1.48]	.930	0.28	[0.21, 0.37]	<.001	0.82	[0.65, 1.04]	.104
County 3	0.87	[0.56, 1.35]	.543	0.24	[0.17, 0.33]	<.001	0.57	[0.44, 0.73]	<.001
County 4	1.86	[1.21, 2.86]	.004	0.97	[0.72, 1.30]	.841	0.86	[0.65, 1.15]	.309
County 5	1.69	[1.16, 2.47]	.006	0.41	[0.32, 0.54]	<.001	0.56	[0.44, 0.71]	<.001
Block 2									
Female X Total Score	1.02	[0.89, 1.17]	.791	0.93	[0.83, 1.03]	.165	0.97	[0.88, 1.06]	.489
∆-2LL		0.07 (1)			1.92 (1)			0.48 (1)	

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. ∆-2LL reflects improvement in model fit upon addition of the interaction term(s) in Block 2. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio.

As shown in Table 6, we examined whether sex moderated the effect of risk level on pretrial misconduct outcomes. Together, the addition of these interactions in Block 2 did not contribute to a significant improvement in model fit over the main-effects only model (i.e., Block 1), *p*s ≥ .310. The sex by risk level interaction effects were not statistically significant in any of the pretrial misconduct models, *p*s ≥ .138.

Table 6. Unweighted Logistic Regression Models of IRAS-PAT Risk Levels and Sex Predicting Pretrial Misconduct

Predictor	Unweighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Risk Level (Low)									
Moderate	3.02	[2.24, 4.07]	<.001	2.59	[2.07, 3.23]	<.001	3.03	[2.54, 3.62]	<.001
High	7.06	[4.97, 10.02]	<.001	5.38	[4.05, 7.16]	<.001	8.33	[6.50, 10.68]	<.001
Female (Male)	0.86	[0.66, 1.11]	.250	0.88	[0.71, 1.08]	.215	0.79	[0.66, 0.93]	.007
Time at Risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	1.02	[0.68, 1.53]	.919	0.29	[0.21, 0.38]	<.001	0.84	[0.66, 1.05]	.127
County 3	0.91	[0.59, 1.41]	.688	0.25	[0.18, 0.35]	<.001	0.60	[0.47, 0.78]	<.001
County 4	1.98	[1.29, 3.04]	.002	1.03	[0.77, 1.37]	.866	0.93	[0.70, 1.23]	.603
County 5	1.81	[1.24, 2.63]	.002	0.44	[0.34, 0.57]	<.001	0.60	[0.47, 0.76]	<.001
Block 2									
Female X Moderate	1.08	[0.54, 2.16]	.836	0.89	[0.54, 1.45]	.638	0.81	[0.55, 1.20]	.300
Female X High	1.37	[0.63, 2.98]	.427	0.63	[0.34, 1.16]	.138	0.84	[0.50, 1.42]	.519
∆-2LL		0.81 (2)			2.34 (2)			1.09 (2)	

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. ∆-2LL reflects improvement in model fit upon addition of the interaction term(s) in Block 2. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio.

Summary of Sex Findings

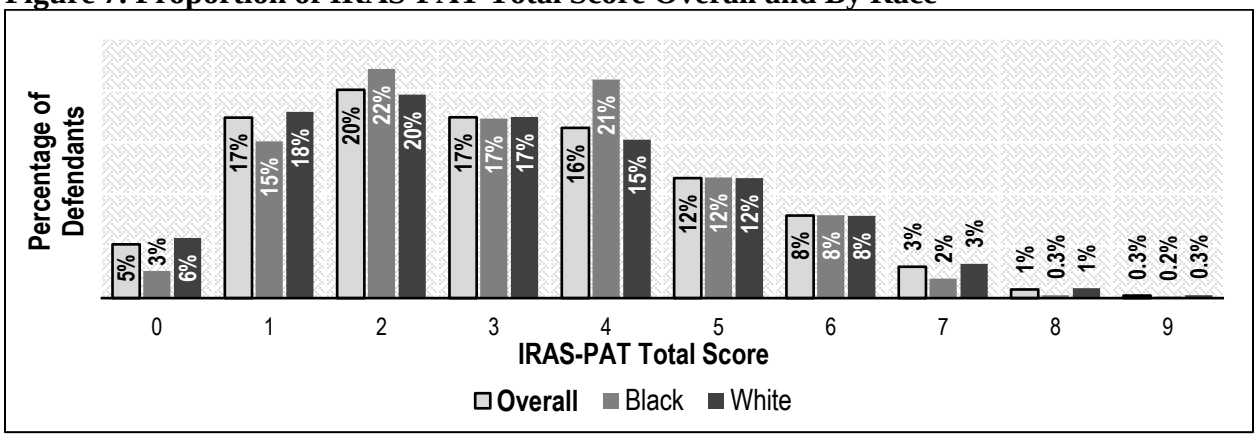
In conclusion, the findings suggest IRAS-PAT assessments produce similar predictive accuracy for female and male defendants. There were no substantive differences in misconduct rates between female and male defendants assessed at each risk level.

Predictive Validity of IRAS-PAT Assessments by Race

Descriptives

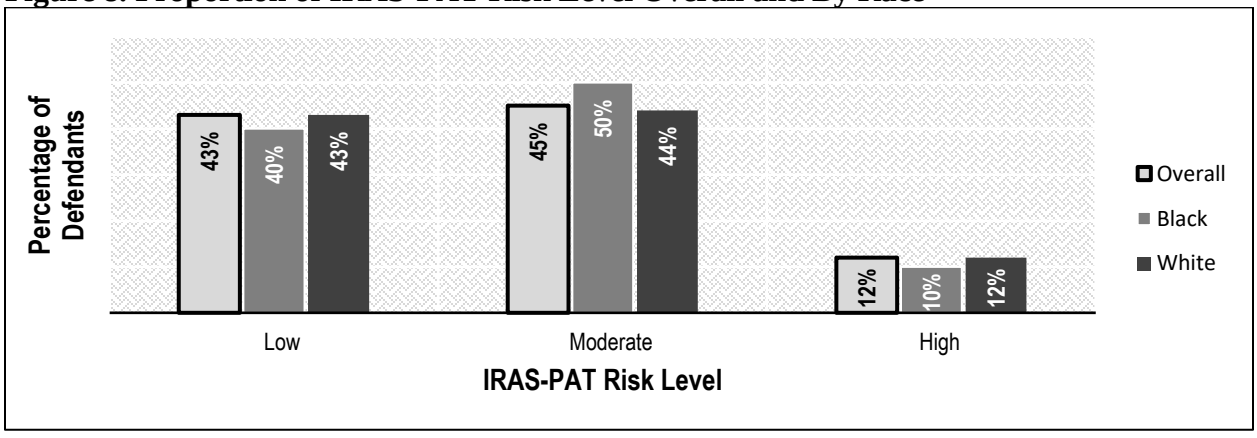
IRAS-PAT. Overall, defendants were relatively Moderate risk, with about one-half of IRAS-PAT scores falling between 3 to 5 (45.4%). IRAS-PAT scores averaged 3.18 (*SD* = 1.69, Range: 0 to 9) for Black defendants and 3.09 (*SD* = 1.90, Range: 0 to 9) for White defendants. There is no significant difference between Black and White defendants' IRAS-PAT total scores (*t*[1149.15] = -1.23, *p* = .219, Cohen's *d* = -0.05). The frequency distribution of IRAS-PAT scores by race is presented in Figure 7.

Figure 7. Proportion of IRAS-PAT Total Score Overall and By Race



Overall, the high proportion of defendants with Moderate risk (*n* = 1,605) is also depicted in Figure 8. As shown, 43 percent of defendants were classified as Low risk (*n* = 1,508) with fewer defendants being classified as High risk (*n* = 426). On average, Black and White defendants had similar rates of risk levels.

Figure 8. Proportion of IRAS-PAT Risk Level Overall and By Race

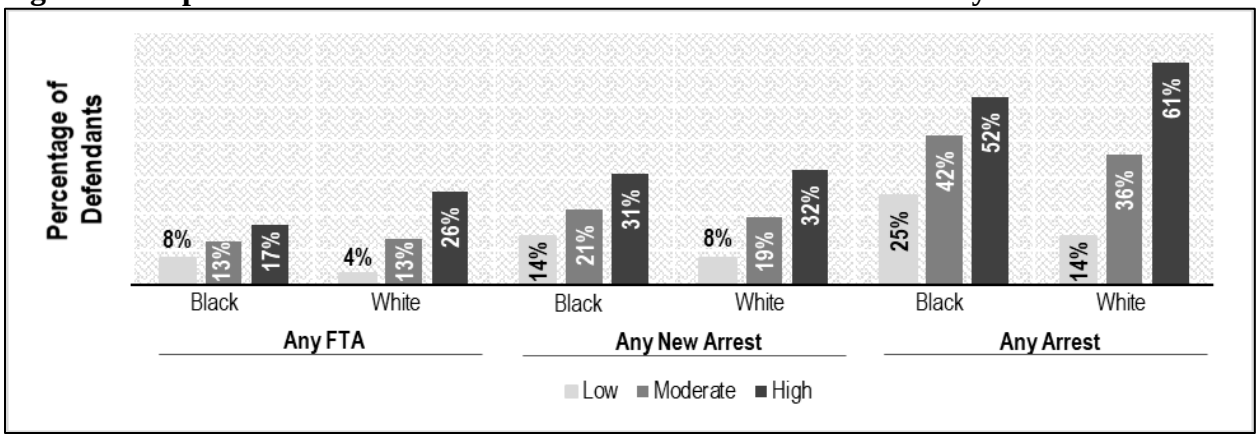


Pretrial Misconduct Outcomes. Following jail release, but prior to case disposition, 10.7% of all defendants had any failure to appear for any court hearing (*n* = 380), and 16.5% had at least one new arrest (*n* = 585). One-third of the overall sample had any arrest prior to case disposition (*n* = 1,094, 30.9%). Black and White defendants differed on rearrest outcomes. Black defendants had higher rates of any arrest (*n* = 249, 36.1%) relative to White defendants (*n* = 845, 29.6%), $\chi^2(1) = 10.94$, $p = .001$, Cramer's $V = 0.06$. Black defendants similarly had higher likelihood of rearrest for a new offense (*n* = 133, 19.3%) compared to White defendants (*n* = 452, 15.9%), $\chi^2(1) = 4.77$, $p = .029$, Cramer's $V = 0.04$. There were no significant differences between Black and White defendants for any FTA (*n* = 76, 11.0% and *n* = 304, 10.7%, respectively).

Frequency Distributions of Risk Level and Pretrial Misconduct Outcomes by Race

Figure 9 presents the distribution of IRAS-PAT risk level and pretrial outcomes by race. Rates of misconduct were higher for Black defendants assessed at Low risk relative to White defendants. Rates were similar between White and Black defendants assessed at Moderate risk. At High risk, however, Black defendants had lower rates of all outcomes relative to White defendants, particularly for any FTA and any arrest outcomes. In other words, there was not a similar incremental gain in misconduct rates from Low to High risk level for Black defendants. See Appendix Table 3A for crosstabulations of risk level and pretrial misconduct outcomes by race.

Figure 9. Proportion of Risk Level and Pretrial Misconduct Outcome by Race



Predictive Accuracy Analyses

AUC of the ROC. In Table 7, we present AUC values and their associated conventions separately by race and outcome. As shown, IRAS-PAT assessments produced significantly weaker predictive accuracy estimates overall for Black defendants relative to White defendants.

Table 7. AUC Values by Pretrial Misconduct Outcome and Race

Pretrial Outcomes	Black *n* = 689			White *n* =2,850		
	AUC (SE)	95% CI	Convention	AUC (SE)	95% CI	Convention
Any FTA	0.59 (0.03)	[0.52, 0.65]	Fair	0.73 (0.01)	[0.70, 0.76]	Excellent
Any New Arrest	0.61 (0.03)	[0.55, 0.66]	Fair	0.69 (0.01)	[0.66, 0.71]	Good
Any Arrest	0.63 (0.02)	[0.58, 0.67]	Fair	0.73 (0.01)	[0.71, 0.75]	Excellent

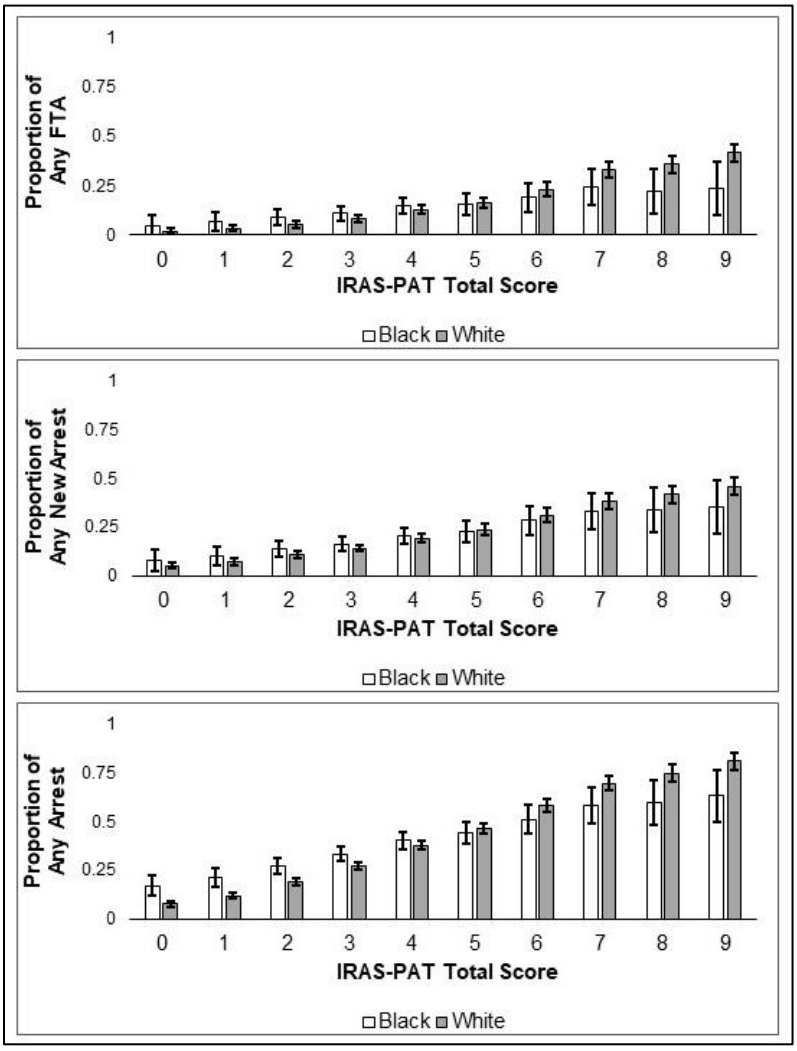
Logistic Regression Models. Table 8 presents results of a series of unweighted logistic regression analyses of IRAS-PAT total scores and race modeling pretrial misconduct outcomes while controlling for county and time at risk. The results from the main-effects only model (i.e., Block 1) showed strong predictive validity of IRAS-PAT assessments across pretrial misconduct outcomes. In Block 2, we examined whether race moderated the effect of total score on pretrial misconduct outcomes. Together, the addition of these interactions contributed to a significant improvement in model fit over Block 1 in two of the models, *p*s < .01. While race by total score was not a statistically significant term in the any new arrest model, $p = .110$, we observed significant race by total score interaction effects in the any FTA and any arrest models (*p*s ≤ .009). As shown in Figure 10, Black defendants at higher total scores had lower predicted rates of any FTA and any arrest relative to White defendants. There were no substantive differences between the unweighted and weighted models. See Appendix Table 4A for weighted models.

Table 8. Unweighted Logistic Regression Models of IRAS-PAT Total Scores and Race Predicting Pretrial Misconduct

Predictor	Unweighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Total Score	1.47	[1.38, 1.57]	<.001	1.40	[1.33, 1.48]	<.001	1.54	[1.47, 1.61]	<.001
Black (White)	1.23	[0.91, 1.66]	.186	1.11	[0.87, 1.41]	.391	1.25	[1.02, 1.52]	.030
Time at Risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	1.03	[0.68, 1.55]	.905	0.28	[0.21, 0.38]	<.001	0.86	[0.68, 1.09]	.219
County 3	0.92	[0.59, 1.43]	.707	0.25	[0.18, 0.34]	<.001	0.59	[0.46, 0.77]	<.001
County 4	2.00	[1.28, 3.14]	.002	1.00	[0.74, 1.36]	.983	0.93	[0.69, 1.25]	.621
County 5	1.81	[1.22, 2.69]	.003	0.43	[0.32, 0.57]	<.001	0.60	[0.47, 0.77]	<.001
Block 2									
Black X Total Score	0.80	[0.68, 0.95]	.009	0.90	[0.79, 1.02]	.110	0.81	[0.73, 0.91]	<.001
Δ-2LL		6.84** (1)			2.53 (1)			12.74*** (1)	

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. Δ-2LL reflects improvement in model fit upon addition of the interaction term(s) in Block 2. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio. *p <.05. **p <.01. ***p <.001. (two-tailed)

Figure 10. Predicted Probabilities of Pretrial Misconduct by IRAS-PAT Total Scores and Race, Unweighted



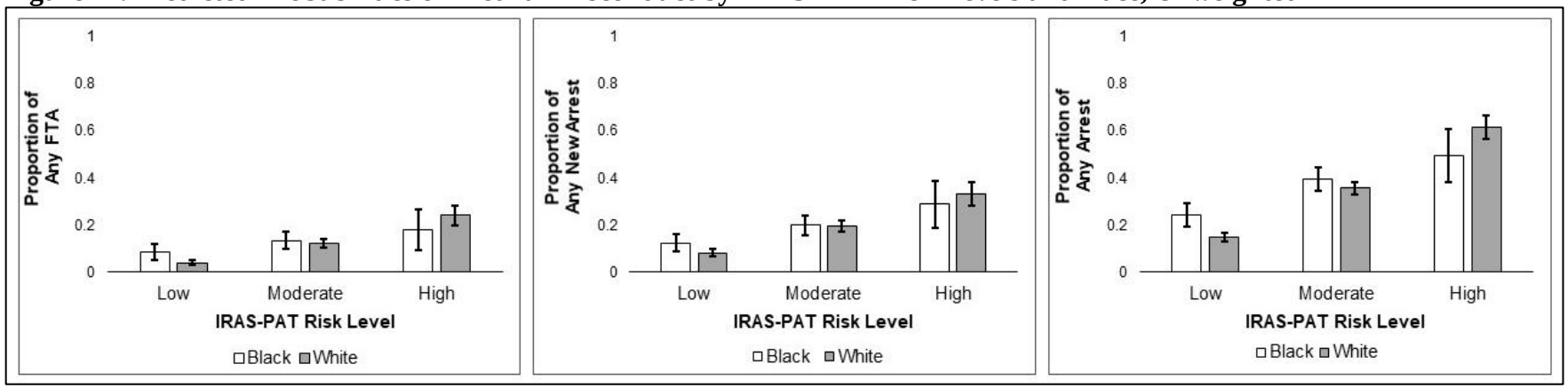
Next, we examined the predictive accuracy of IRAS-PAT risk levels by race. The results from the main-effects only model (i.e., Block 1) showed that IRAS-PAT risk levels had a similar ability to discriminate in the prediction of pretrial misconduct outcomes (Table 9). In Block 2, we examined whether race moderated the effect of risk level on pretrial misconduct outcomes. Together, the addition of these interactions contributed to a significant improvement in model fit over Block 1 in two of the models, *p*s < .05. For Moderate risk level, we observed significant race by Moderate risk level interactions effect in the any FTA model ($p = .035$) and any arrest model ($p = .022$). However, we observed stronger, significant race by High risk level interaction effects in the any FTA model ($p = .006$), any new arrest model ($p = .049$), and any arrest model ($p < .001$). As shown in Figure 11, Black defendants classified at High risk had lower predicted rates of pretrial misconduct outcomes relative to White defendants, particularly for any FTA and any arrest. In the weighted analyses, the race by Moderate risk level was no longer a statistically significant term in the models. Moreover, the race by High risk level interaction term in the any new arrest model was no longer significant. See Appendix Table 5A for weighted models.

Table 9. Unweighted Logistic Regression Models of IRAS-PAT Risk Levels and Race Predicting Pretrial Misconduct

Predictor	Unweighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Risk Level (Low)									
Moderate	3.02	[2.24, 4.06]	<.001	2.58	[2.07, 3.23]	<.001	3.02	[2.53, 3.60]	<.001
High	7.00	[4.94, 9.94]	<.001	5.34	[4.02, 7.11]	<.001	8.23	[6.42, 10.55]	<.001
Black (White)	1.22	[0.90, 1.65]	.192	1.13	[0.89, 1.43]	.326	1.28	[1.05, 1.56]	.014
Time at Risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	1.07	[0.71, 1.61]	.763	0.29	[0.22, 0.39]	<.001	0.88	[0.69, 1.11]	.272
County 3	0.96	[0.62, 1.50]	.863	0.26	[0.19, 0.36]	<.001	0.63	[0.49, 0.82]	<.001
County 4	2.13	[1.36, 3.34]	.001	1.07	[0.79, 1.45]	.684	1.01	[0.75, 1.34]	.967
County 5	1.93	[1.30, 2.85]	.001	0.45	[0.35, 0.60]	<.001	0.64	[0.50, 0.82]	<.001
Block 2									
Black X Moderate	0.49	[0.25, 0.95]	.035	0.63	[0.38, 1.04]	.071	0.62	[0.41, 0.93]	.022
Black X High	0.29	[0.12, 0.70]	.006	0.49	[0.24, 1.00]	.049	0.31	[0.17, 0.58]	<.001
Δ-2LL	8.11* (2)			4.78 (2)			14.09*** (2)		

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. Δ-2LL reflects improvement in model fit upon addition of the interaction term(s) in Block 2. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio. *p <.05. **p <.01. ***p <.001. (two-tailed)

Figure 11. Predicted Probabilities of Pretrial Misconduct by IRAS-PAT Risk Levels and Race, Unweighted



Together, these results provide evidence that IRAS-PAT assessments produce differential predictive accuracy and over-classification at High risk level for Black defendants, particularly for FTA risk and risk of any arrest. Importantly, these results do not inform why IRAS-PAT assessments may be producing different levels of predictive accuracy between Black and White defendants, including whether specific IRAS-PAT items may be driving trends. As such, examination of differential item functioning of IRAS-PAT items by race is needed.

Item-Level Analyses

To further examine predictive accuracy of IRAS-PAT assessments by race, we conducted an item-level analysis of the IRAS-PAT. This involved first conducting logistic regression models of IRAS-PAT items predicting pretrial misconduct outcomes separately for Black and White defendants. These models are presented in Table 10-12. Significant odds ratios are bolded. For White defendants, we explored item-level functioning in three separate samples. The first sample was unweighted, representing all White defendants in the original sample. Second, to address concerns about baseline differences between Black and White defendants, we matched White defendants to Black defendants using propensity score weighting. Third, to address potential differences as a function of sample size, which was considerably larger for White defendants in the unweighted sample, we conducted analyses using a stratified sub-sample of White defendants. These analytic decisions are discussed below.

Summary of Item-Level Analytic Considerations	
Regression Without the Use of Propensity Scores (Unweighted)	Multivariable models unweighted by propensity scores, which do not address concerns about unbalanced groups, are helpful because they provide a baseline model for comparison to other models that integrate estimation and sampling considerations.
Using Propensity Scores as Weights in a Regression	Multivariable models weighted by propensity scores statistically balance individuals on a specific set of covariates based on their likelihood of being in a group. Black defendants were assigned a propensity score of 1, whereas White defendants were assigned a score above or below 1 that was calculated in the propensity score analysis based on the observed covariates. We then weighted estimations using these propensity scores.
Regression with a Stratified Sample	To balance the racial groups based on sample size, we developed a stratified sample of White defendants. We randomly selected White defendants within each county to create a sample of White defendants that was equal to the proportion of Black defendants within the respective county. This resulted in a stratified sample of 689 White defendants.

As shown in Table 10, For Black defendants, unemployment (Item 4, OR = 2.08) was the strongest and only unique predictor of any FTA. In the unweighted model, age at first arrest (Item 1, OR = 2.91), history of FTAs (Item 2, OR Range: 2.10-2.12), three or more prior incarcerations (Item 3, OR = 1.95) and unemployment (Item 4, OR = 2.14) were the strongest unique predictors for White defendants. Part-time employment (Item 4) and illegal drug use in the past 6 months (Item 6) did not contribute uniquely to the prediction of any FTA for White defendants. As shown, following application of weights and stratification, only two items remained significant predictors of any FTA for White defendants: three or more prior incarcerations (Item 3) and unemployment (Item 4). See Appendix Table 6A for complete models.

Table 10. Summary of Logistic Regression Models of IRAS-PAT Items Predicting Any FTA, by Race

Predictor	Odds Ratio Status for Any FTA			
	Black	White		
	n = 688	Unweighted *n* = 2,847	Weighted *n* = 2,847	Stratified *n* = 689
Item 1 - Age at first arrest	ns	**2.91**	ns	ns
Item 2 - Number of FTAs				
1	ns	**2.10**	ns	ns
2 or more	ns	**2.12**	ns	ns
Item 3 - 3+ prior incarcerations	ns	**1.95**	**2.49**	**2.47**
Item 4 - Employed				
Part-time	ns	ns	ns	ns
Not employed	**2.08**	**2.14**	**2.26**	**4.28**
Item 5 - Residential instability	ns	**1.43**	ns	ns
Item 6 - Illegal drug use 6 months	ns	ns	ns	ns
Item 7 - Severe drug use	ns	**1.74**	ns	ns

As shown in Table 11, severe drug use problem (Item 7, OR = 2.04) was the only unique predictor of any new arrest for Black defendants. Age at first arrest (Item 1), a history of FTAs in the past 24 months (Item 2), three or more prior incarcerations (Item 3), part-time employment and unemployment (Item 4), residential instability (Item 5), and illegal drug use in the past 6 months (Item 6) did not contribute uniquely to the prediction of any new arrest for Black defendants. For White defendants in the unweighted model, three or more prior incarcerations (Item 3, OR = 2.04), unemployment (Item 4, OR = 1.68), and residential instability (Item 5, OR = 1.75) were the strongest unique predictors. Age at first arrest (Item 1) and a history of FTAs in the past 24 months (Item 2) did not contribute uniquely to the prediction of any new arrest for White defendants. As shown, following application of weights and stratification, only three items remained significant predictors of any new arrest for White defendants: three or more prior incarcerations (Item 3), unemployment (Item 4), and residential instability (Item 5). See Appendix Table 7A for complete models.

Table 11. Summary of Logistic Regression Models of IRAS-PAT Items Predicting Any New Arrest, by Race

Predictor	Odds Ratio Status for Any New Arrest			
	Black	White		
	n = 688	Unweighted *n* = 2,847	Weighted *n* = 2,847	Stratified *n* = 689
Item 1 – Age at first arrest	ns	ns	ns	ns
Item 2 - Number of FTAs				
1	ns	ns	ns	ns
2 or more	ns	ns	ns	ns
Item 3 - 3+ prior incarcerations	ns	**2.04**	**2.34**	**1.72**
Item 4 - Employed				
Part-time	ns	**1.46**	ns	ns
Not employed	ns	**1.68**	ns	**1.71**
Item 5 - Residential instability	ns	**1.75**	**1.79**	**1.73**
Item 6 - Illegal drug use 6 months	ns	**1.46**	ns	ns
Item 7 - Severe drug use	**2.04**	**1.51**	ns	ns

For Black defendants, three or more prior incarcerations (Item 3, OR = 1.43), unemployment (Item 4, OR = 1.64), and a severe drug use problem (Item 7, OR = 2.30) were the strongest unique predictors of any arrest (Table 12). Age at first arrest (Item 1), a history of FTAs in the past 24 months (Item 2), part-time employment (Item 4), residential instability (Item 5), and illegal drug use in the past 6 months (Item 6) did not contribute uniquely to the prediction of any arrest for Black defendants. For White defendants in the unweighted model, age at first arrest (Item 1, OR = 1.69), a history of FTAs in the past 24 months (Item 2, OR Range: 1.95 to 2.09) three or more prior incarcerations (Item 3, OR = 2.65), employment status (Item 4, OR Range: 1.53 to 2.10), residential instability (Item 5, OR = 1.72), illegal drug use in the past 6 months (Item 6, OR = 1.27), and severe drug use problem (Item 7, OR = 1.58) contributed uniquely to the prediction of any arrest. As shown, following application of weights and stratification, five items remained significant predictors of any arrest for White defendants: age at first arrest (Item 1), three or more prior incarcerations (Item 3), unemployment (Item 4), residential instability (Item 5), and illegal drug use in the past 6 months (Item 6). See Appendix Table 8A for complete models.

Table 12. Summary of Logistic Regression Models of IRAS-PAT Items Predicting Any Arrest, by Race

Predictor	Odds Ratio Status for Any Arrest			
	Black	White		
	n = 688	Unweighted *n* = 2,847	Weighted *n* = 2,847	Stratified *n* = 689
Item 1 – Age at first arrest	ns	**1.69**	**2.35**	ns
Item 2 - Number of FTAs				
1	ns	**1.95**	ns	ns
2 or more	ns	**2.09**	ns	ns
Item 3 - 3+ prior incarcerations	**1.43**	**2.65**	**3.17**	**2.30**
Item 4 - Employed				
Part-time	ns	**1.53**	ns	ns
Not employed	**1.64**	**2.10**	**2.01**	**1.95**
Item 5 - Residential instability	ns	**1.72**	**2.06**	**1.63**
Item 6 - Illegal drug use 6 months	ns	**1.27**	ns	**1.56**
Item 7 - Severe drug use	**2.30**	**1.58**	ns	ns

Based on the evidence that some items functioned differently by race, we examined whether race moderated the effect of IRAS-PAT items on pretrial misconduct outcomes. Table 13 presents results of hierarchical weighted logistic regression models of IRAS-PAT items for the sample overall, adding race as a covariate (Block 1) and item interactions with race (Block 2).

Across all pretrial misconduct outcomes, few significant main effects were consistently observed. However, two items uniquely contributed to the prediction of all three outcomes: three or more prior incarcerations (Item 3, OR Range = 1.89 to 2.62) and unemployment (Item 4, OR Range = 1.47 to 2.24).

In Block 2, we examined the interaction effects of IRAS-PAT items on pretrial misconduct outcomes. While race by IRAS-PAT items were not statistically significant interaction terms in the any FTA model, *p*s ≥ .105, we observed strong evidence of differential item functioning by race for rearrest outcomes. For any new arrest, race by three or more prior incarcerations (Item 3, $p = .003$) was a significant interaction effect. Black defendants with three or more prior incarcerations had lower predicted rates of any new arrest relative to White defendants (Figure 12).

For any arrest, race by three or more prior incarcerations (Item 3, $p = .001$) and race by residential instability (Item 5, $p = .024$) emerged as significant interaction effects. Black defendants with three or more prior incarcerations (Item 3) or did not live at the same residence in the past six months (Item 5) had lower predicted rates of any arrest relative to White defendants (Figure 12). Overall, results provide some evidence that items, specifically Item 3 and Item 5, may be contributing to the disparate predictive accuracy for rearrest outcomes between Black and White defendants. See Appendix Table 9A for unweighted models.

Figure 12. Predicted Probabilities of Rearrest Outcomes by IRAS-PAT Items and Race, Weighted

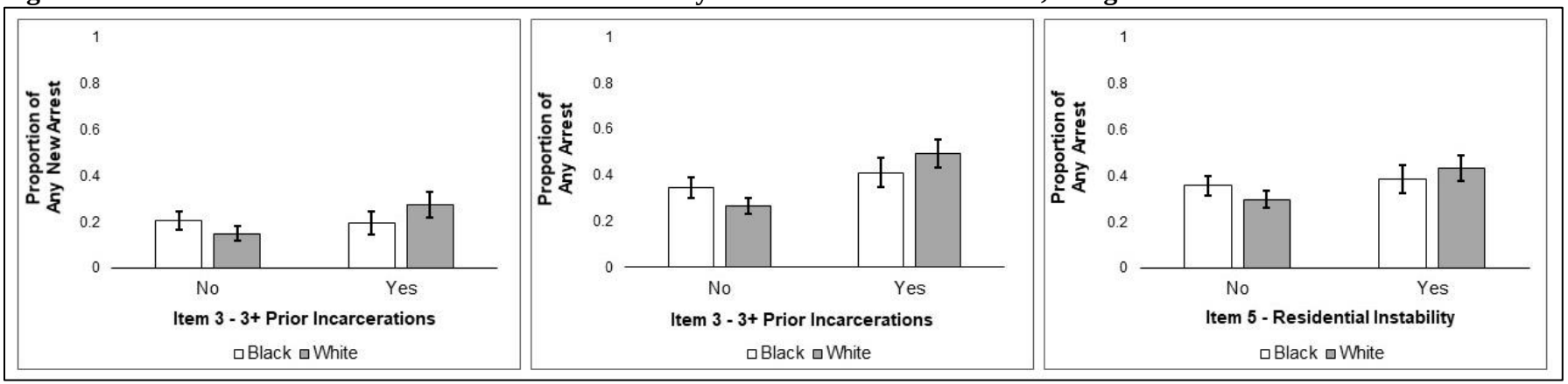


Table 13. Weighted Logistic Regression Models of Race and IRAS-PAT Items Predicting Pretrial Misconduct

Predictor	Weighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Black[a]	0.97	[0.65, 1.45]	.893	1.05	[0.78, 1.42]	.729	1.10	[0.85, 1.42]	.454
Item 1 - Age at first arrest[b]	2.57	[0.88, 7.52]	.086	1.47	[0.77, 2.80]	.248	2.15	[1.24, 3.74]	.007
Item 2 - Number of FTAs[c]									
1	1.68	[0.97, 2.92]	.065	1.05	[0.64, 1.72]	.859	1.27	[0.81, 2.00]	.296
2 or more	1.36	[0.62, 3.00]	.442	0.99	[0.44, 2.24]	.983	2.03	[0.98, 4.21]	.058
Item 3 - 3+ prior incarcerations[d]	2.23	[1.44, 3.44]	<.001	1.89	[1.34, 2.66]	<.001	2.62	[1.97, 3.49]	<.001
Item 4 - Employed[e]									
Part-time	0.90	[0.50, 1.61]	.716	1.35	[0.84, 2.17]	.209	1.44	[0.98, 2.10]	.062
Not employed	2.24	[1.41, 3.57]	.001	1.47	[1.02, 2.12]	.037	1.92	[1.41, 2.63]	<.001
Item 5 - Residential instability[f]	1.28	[0.83, 1.98]	.270	1.68	[1.20, 2.34]	.002	1.80	[1.36, 2.39]	<.001
Item 6 - Illegal drug use 6 mo[g]	1.06	[0.65, 1.72]	.822	1.40	[0.98, 2.00]	.065	1.19	[0.87, 1.62]	.275
Item 7 - Severe drug use[h]	1.40	[0.86, 2.28]	.175	1.33	[0.84, 2.10]	.219	1.64	[1.12, 2.41]	.011
Time at risk	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County[i]									
County 2	1.03	[0.55, 1.93]	.929	0.33	[0.21, 0.54]	<.001	0.82	[0.55, 1.21]	.308
County 3	1.00	[0.45, 2.21]	.992	0.22	[0.13, 0.37]	<.001	0.64	[0.42, 0.97]	.035
County 4	1.81	[0.68, 4.80]	.231	1.12	[0.60, 2.09]	.722	0.77	[0.40, 1.50]	.447
County 5	2.20	[1.13, 4.26]	.020	0.47	[0.31, 0.71]	<.001	0.60	[0.41, 0.88]	.009
Block 2									
Black X Item 1	0.37	[0.06, 2.28]	.282	3.34	[0.70, 15.91]	.129	0.59	[0.21, 1.64]	.315
Black X Item 2 – 1 FTA	1.12	[0.41, 3.04]	.831	1.54	[0.66, 3.60]	.323	1.17	[0.55, 2.50]	.681
Black X Item 2 – 2 or more FTAs	0.16	[0.02, 1.52]	.110	3.79	[0.86, 16.76]	.079	0.58	[0.15, 2.20]	.421
Black X Item 3	0.54	[0.25, 1.14]	.105	0.40	[0.22, 0.73]	.003	0.43	[0.26, 0.72]	.001
Black X Item 4 – Part-time	1.38	[0.47, 4.02]	.560	1.31	[0.58, 2.95]	.520	1.10	[0.57, 2.14]	.778
Black X Item 4 – Not Employed	0.91	[0.41, 2.02]	.816	0.92	[0.49, 1.73]	.788	0.81	[0.47, 1.39]	.441
Black X Item 5	0.84	[0.40, 1.79]	.651	0.72	[0.40, 1.30]	.276	0.57	[0.34, 0.93]	.024
Black X Item 6	0.70	[0.32, 1.56]	.384	0.91	[0.49, 1.70]	.763	0.83	[0.49, 1.42]	.502
Black X Item 7	1.25	[0.50, 3.13]	.639	1.28	[0.58, 2.81]	.542	1.47	[0.75, 2.88]	.264

Note. *N* = 3,539. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio. [a]Reference: White. [b]Item 1 reference: 33 or older. [c]Item 2 reference: No FTA warrants past 24 months. [d]Item 3 reference: Two or less prior jail incarcerations. [e]Item 4 reference: Yes, Full-time employment at time of arrest. [f]Item 5 reference: Lived at current residence past 6 months. [g]Item 6 reference: No illegal drug use during past 6 months. [h]Item 7 reference: No severe drug use problem. [i]Reference: County 1.

Summary of Race Findings

Overall, several findings emerged from the race-specific analyses:

- IRAS-PAT assessments predicted outcomes for both Black and White defendants. However, IRAS-PAT assessments produced weaker predictive accuracy estimates overall for Black defendants relative to White defendants.
- Black defendants classified at High risk have lower predicted values of any FTA and any arrest relative to White defendants.
- There were few substantive differences between the unweighted and weighted models adjusting for defendant characteristics.
- Rates of pretrial misconduct outcomes are higher for Black defendants assessed at Low risk relative to White defendants. At High risk, however, Black defendants have lower rates of all outcomes relative to White defendants, particularly for any FTA and any arrest outcomes.
- Following application of weights and stratification in the item-level sub-group analyses, findings showed consistent evidence of differential item functioning of IRAS-PAT items by race. Item-level predictive validity differed for Black and White defendants and by outcome.
- The item-level analyses in the overall sample revealed that two IRAS-PAT items function differently by race in the rearrest models, specifically Item 3 and Item 5, which may be contributing to the disparate predictive accuracy for rearrest outcomes between Black and White defendants.

CONCLUSION

The purpose of this investigation was to examine the predictive accuracy of IRAS-PAT assessments by age, sex, and race in a pooled dataset of five Indiana Counties (Allen, Hamilton, Hendricks, Jefferson, and Monroe). Overall, our findings provided little evidence of predictive bias in IRAS-PAT assessments as a function of age or sex. However, there were notable differences in predictive accuracy as a function of race. Below we summarize and discuss these findings in greater detail.

Age

Overall, findings showed little evidence of differences in predictive validity as a function of age (i.e., under 33 vs. 33 and older). Although we observed slight differences in AUC estimates for any FTA (0.68 vs. 0.73), these differences were not statistically significant. There were no notable differences in predictive validity estimates for arrest outcomes. We are not aware of any prior systematic investigation examining predictive bias in pretrial risk assessments as a function of age.

Sex

Similar to age, we found no consistent evidence suggesting predictive bias in IRAS-PAT assessments between male and female defendants. Where we observed slight differences (e.g., in AUC estimates for any FTA), these differences were not statistically significant. These findings are consistent with prior studies that have shown little evidence suggestive of predictive bias in pretrial risk assessments as a function of sex (Desmarais et al., 2020).

Race

In contrast to investigations of sex and age, we found that IRAS-PAT assessments produced weaker assessments of pretrial misconduct risk for Black defendants relative to White defendants. Importantly, IRAS-PAT assessments still predicted pretrial misconduct outcomes with fair accuracy for Black defendants, but estimates overall were weaker relative to those produced for White defendants. To illustrate, whereas total scores produced AUC estimates ranging from 0.59-0.63 for Black defendants, AUC estimates for White defendants ranged from 0.69-0.73. Overall, predictive bias was most apparent for any FTA and any arrest outcomes, and less so for likelihood of any new arrest. Results of multivariable models suggested that differences were driven primarily by differences in rates of misconduct among Black and White defendants who were classified at High risk, in particular.

To explore potential drivers of predictive bias between Black and White defendants, we conducted an item-level analysis of the predictive accuracy of IRAS-PAT assessments. These findings showed notable item-level differences in predictive accuracy across outcomes and by race. For any FTA, only Item 7 (severe drug use) emerged as a unique predictor for Black defendants. In contrast, nearly all items uniquely predicted FTA risk in White defendants in the unweighted sample and Item 3 (3+ prior incarcerations) and Item 4 (unemployment) in the weighted and stratified samples. Item-level findings for any new arrest were similar, with only

Item 7 uniquely predicting any new arrest among Black defendants, and Item 3 (3+ prior incarcerations), Item 4 (unemployment), and Item 5 (residential instability) predicting outcomes in the weighted and stratified samples of White defendants. There were more unique predictors of any arrest for both White and Black defendants, though there were notable differences in the strength of shared significant predictors across groups. For example, Item 3 (3+ prior incarcerations) and Item 4 (unemployment) emerged as much stronger predictors of any arrest for White defendants relative to Black defendants, though the opposite trend was true for Item 7 (severe drug use).

Significance tests of these differences suggested that Item 3 (3+ prior incarcerations) and Item 5 (residential instability) were most disparate in their ability to uniquely predict pretrial outcomes between Black and White defendants. These findings suggest that these items, in particular, do not function similarly as risk factors for Black and White defendants. Importantly, both likelihood of incarceration (Abrams et al., 2012; Bales & Piquero, 2012; Gelman et al., 2007; Kutateladze et al., 2014)) and access to stable housing (Callis & Kresin, 2016) are known disparities that reflect systemic disadvantage among racial minorities. Thus, for Black individuals, these items may be measuring relative disadvantage rather than misconduct risk, decreasing their predictive utility as risk factors for pretrial misconduct.

More broadly, it is important to note that although these findings suggest evidence of predictive bias, they do not provide evidence that IRAS-PAT assessments are having a disparate impact on Black defendants relative to White defendants. To the contrary, recent findings from Indiana suggest that the use of IRAS-PAT assessments had a similar impact on pretrial decision-making for Black and White defendants relative to decision-making as usual (Lowder, Grommon, et al., 2020). Overall, IRAS-PAT assessments are predicting pretrial misconduct with good accuracy for its pretrial population as a whole (Lowder, Lawson, et al., 2020). Scholars have noted that there are inherent tradeoffs to the fairness and accuracy of risk assessments, particularly when there is evidence of different rates of misconduct among different pretrial populations (Berk et al., 2017; Kleinberg et al., 2016). Achieving accurate assessments of risk can come at a cost to fairness, and vise-versa. Jurisdictions must decide how to weigh these considerations by prioritizing public safety at the cost of fairness or achieving fairness at the cost of compromising public safety (Corbett-Davies et al., 2017).

Limitations and Future Directions

We note that these findings are based on a five-county sample of Indiana pretrial defendants, and it is unclear whether this sample generalizes to Indiana's entire pretrial population. Additionally, Black defendants were underrepresented in the sample. Only one jurisdiction included in this investigation (Allen County) has a resident population that is over 10% Black, a proportion which reflects Indiana's statewide demographic profile. However, our primary conclusions, particularly with respect to item-level factors, were robust to disparate sample sizes. Finally, we had limited availability of other measures that could potentially improve the predictive performance of the IRAS-PAT. These include other dynamic risk factors that are more robust to the relative disadvantage Black defendants experience in society more broadly as well as measures of relative disadvantage that could function to discount specific items.

Our findings warrant further investigation into whether the predictive performance of IRAS-PAT assessments could be improved for Black defendants, in particular. A recent study examined the use of debiasing strategies to correct for differences in predictive accuracy (Skeem & Lowenkamp, 2020). These strategies include removing variability attributable to race from assessment scores and discounting item scores that reflect systemic disadvantage among racial disparities (e.g., criminal history). We note that assessments in this particular investigation produced more comparable estimates across racial groups, and it is unclear whether these strategies would generalize to IRAS-PAT assessments. In addition to debiasing strategies, there may be other measures that may predict outcomes more accurately for Black defendants or that could account for relative disadvantage and correct for the overclassification of Black defendants at high risk levels. Given differences observed in this investigation, these approaches are worthy of further investigation.

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Appendix

Age

Table 1A. Crosstabulations of Risk Classifications and Pretrial Outcomes by Age

Pretrial Outcomes	Risk Level					
	Low		Moderate		High	
	Under 33 *n* = 773	33 or older *n* = 735	Under 33 *n* = 1,000	33 or older *n* = 605	Under 33 *n* = 258	33 or older *n* = 168
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Any FTA	36 (4.7)	30 (4.1)	129 (12.9)	80 (13.2)	59 (22.9)	46 (27.4)
Any New Arrest	63 (8.2)	71 (9.7)	200 (20.0)	115 (19.0)	76 (29.5)	60 (35.7)
Any Arrest	110 (14.2)	130 (17.7)	356 (35.6)	243 (40.2)	147 (57.0)	108 (64.3)

Sex

Table 2A. Crosstabulations of Risk Classifications and Pretrial Outcomes by Sex

Pretrial Outcomes	Risk Level					
	Low		Moderate		High	
	Female *n* = 445	Male *n* = 1,063	Female *n* = 433	Male *n* = 1,172	Female *n* = 139	Male *n* = 287
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Any FTA	15 (3.4)	51 (4.8)	50 (11.5)	159 (13.6)	38 (27.3)	67 (23.3)
Any New Arrest	40 (9.0)	94 (8.8)	80 (18.5)	235 (20.1)	37 (26.6)	99 (34.5)
Any Arrest	66 (14.8)	174 (16.4)	140 (32.3)	459 (39.2)	79 (56.8)	176 (61.3)

Race

Table 3A. Crosstabulations of Risk Classifications and Pretrial Outcomes by Race

Pretrial Outcomes	Risk Level					
	Low		Moderate		High	
	Black *n* = 274	White *n* = 1,234	Black *n* = 344	White *n* = 1,261	Black *n* = 71	White *n* = 355
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Any FTA	21 (7.7)	45 (3.6)	43 (12.5)	166 (13.2)	12 (16.9)	93 (26.2)
Any New Arrest	38 (13.9)	96 (7.8)	73 (21.2)	242 (19.2)	22 (31.0)	114 (32.1)
Any Arrest	69 (25.2)	171 (13.9)	143 (41.6)	456 (36.2)	37 (52.1)	218 (61.4)

Table 4A. Weighted Logistic Regression Models of IRAS-PAT Total Scores and Race Predicting Pretrial Misconduct

Predictor	Weighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Total Score	1.46	[1.30, 1.63]	<.001	1.35	[1.23, 1.47]	<.001	1.55	[1.43, 1.69]	<.001
Black (White)	1.04	[0.71, 1.53]	.828	1.08	[0.81, 1.44]	.601	1.16	[0.91, 1.49]	.236
Time at Risk	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	0.96	[0.49, 1.88]	.909	0.33	[0.21, 0.52]	<.001	0.82	[0.57, 1.18]	.291
County 3	1.02	[0.47, 2.24]	.955	0.22	[0.13, 0.37]	<.001	0.66	[0.44, 0.98]	.042
County 4	1.86	[0.70, 4.93]	.215	1.19	[0.66, 2.17]	.565	0.86	[0.45, 1.65]	.659
County 5	2.22	[1.13, 4.34]	.020	0.46	[0.30, 0.69]	<.001	0.62	[0.42, 0.90]	.012
Block 2									
Black X Total Score	0.82	[0.68, 1.00]	.050	0.94	[0.81, 1.10]	.453	0.80	[0.69, 0.93]	.003

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio.

Table 5A. Weighted Logistic Regression Models of IRAS-PAT Risk Levels and Race Predicting Pretrial Misconduct

Predictor	Weighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Risk Level (Low)									
Moderate	2.49	[1.45, 4.28]	.001	2.41	[1.64, 3.53]	<.001	2.86	[2.08, 3.92]	<.001
High	6.56	[3.70, 11.63]	<.001	4.15	[2.59, 6.63]	<.001	8.33	[5.50, 12.62]	<.001
Black (White)	1.03	[0.70, 1.50]	.887	1.09	[0.82, 1.45]	.560	1.18	[0.92, 1.50]	.195
Time at Risk	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County (1)									
County 2	1.00	[0.51, 1.94]	.991	0.34	[0.22, 0.53]	<.001	0.85	[0.59, 1.22]	.380
County 3	1.05	[0.48, 2.28]	.907	0.23	[0.14, 0.38]	<.001	0.70	[0.47, 1.04]	.079
County 4	1.97	[0.75, 5.18]	.171	1.29	[0.71, 2.35]	.401	0.95	[0.51, 1.80]	.885
County 5	2.32	[1.19, 4.52]	.014	0.49	[0.32, 0.73]	<.001	0.66	[0.45, 0.96]	.029
Block 2									
Black X Moderate	0.67	[0.27, 1.63]	.376	0.70	[0.37, 1.33]	.277	0.67	[0.39, 1.13]	.135
Black X High	0.34	[0.12, 0.98]	.045	0.67	[0.28, 1.60]	.368	0.31	[0.14, 0.66]	.003

Note. *N* = 3,539. For categorical variables, reference group indicated in parentheses. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio.

Table 6A. Logistic Regression Models of IRAS-PAT Items Predicting Any FTA, by Race

Predictor	Any FTA											
	Black			White								
	n = 688			Unweighted *n* = 2,847			Weighted *n* = 2,847			Stratified *n* = 689		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Item 1 - Age at first arrest[a]	1.35	[0.39, 4.71]	.640	2.91	[1.44, 5.88]	.003	3.03	[0.74, 12.52]	.125	1.88	[0.41, 8.50]	.415
Item 2 - Number of FTAs[b]												
1	1.67	[0.85, 3.31]	.138	2.10	[1.44, 3.06]	<.001	1.68	[0.86, 3.29]	.131	2.02	[0.82, 5.01]	.129
2 or more	0.23	[0.03, 1.88]	.172	2.12	[1.23, 3.66]	.007	1.56	[0.65, 3.76]	.317	0.46	[0.05, 4.17]	.492
Item 3 - 3+ prior incarcerations[c]	1.36	[0.81, 2.30]	.250	1.95	[1.48, 2.56]	<.001	2.49	[1.46, 4.25]	.001	2.47	[1.28, 4.74]	.007
Item 4 - Employed[d]												
Part-time	1.17	[0.53, 2.57]	.699	1.12	[0.72, 1.74]	.612	0.84	[0.41, 1.73]	.638	1.98	[0.70, 5.60]	.198
Not employed	2.08	[1.19, 3.65]	.011	2.14	[1.58, 2.89]	<.001	2.26	[1.28, 4.00]	.005	4.28	[2.03, 9.04]	<.001
Item 5 - Residential instability[e]	1.05	[0.61, 1.79]	.858	1.43	[1.09, 1.89]	.011	1.31	[0.77, 2.22]	.313	1.44	[0.75, 2.76]	.277
Item 6 - Illegal drug use 6 mo[f]	0.79	[0.45, 1.40]	.421	1.07	[0.78, 1.49]	.662	1.13	[0.62, 2.06]	.690	1.37	[0.66, 2.86]	.402
Item 7 - Severe drug use[g]	1.48	[0.69, 3.16]	.309	1.74	[1.23, 2.45]	.002	1.39	[0.79, 2.46]	.258	1.19	[0.51, 2.79]	.691
Time at risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.01]	<.001
County[h]												
County 2	1.30	[0.65, 2.62]	.454	0.96	[0.54, 1.70]	.891	0.91	[0.39, 2.10]	.821	1.02	[0.33, 3.11]	.976
County 3	0.96	[0.43, 2.14]	.914	0.89	[0.49, 1.59]	.684	0.97	[0.36, 2.66]	.957	0.97	[0.34, 2.75]	.952
County 4	0.46	[0.05, 3.87]	.473	1.92	[1.10, 3.37]	.022	2.21	[0.69, 7.03]	.180	2.98	[0.70, 12.68]	.140
County 5	1.51	[0.75, 3.05]	.248	1.80	[1.07, 3.03]	.027	2.25	[0.99, 5.11]	.054	3.53	[1.48, 8.44]	.005

Note. OR = odds ratio; CI = confidence interval for odds ratio. [a]Item 1 reference: 33 or older. [b]Item 2 reference: No FTA warrants past 24 months. [c]Item 3 reference: Two or less prior jail incarcerations. [d]Item 4 reference: Yes, Full-time employment at time of arrest. [e]Item 5 reference: Lived at current residence past 6 months. [f]Item 6 reference: No illegal drug use during past 6 months. [g]Item 7 reference: No severe drug use problem. [h]Reference: County 1.

Table 7A. Logistic Regression Models of IRAS-PAT Items Predicting Any New Arrest, by Race

Predictor	Any New Arrest											
	Black			White								
	n = 688			Unweighted *n* = 2,847			Weighted *n* = 2,847			Stratified *n* = 689		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Item 1 - Age at first arrest[a]	3.59	[0.83, 15.57]	.088	1.08	[0.72, 1.63]	.709	1.20	[0.58, 2.48]	.625	1.34	[0.58, 3.14]	.494
Item 2 - Number of FTAs[b]												
1	1.52	[0.80, 2.88]	.204	1.27	[0.89, 1.80]	.184	0.96	[0.53, 1.76]	.902	1.10	[0.50, 2.45]	.810
2 or more	2.75	[0.96, 7.87]	.060	1.16	[0.68, 1.98]	.583	0.74	[0.26, 2.07]	.560	0.74	[0.15, 3.64]	.712
Item 3 - 3+ prior incarcerations[c]	0.93	[0.60, 1.43]	.727	2.04	[1.62, 2.56]	<.001	2.34	[1.53, 3.58]	<.001	1.72	[1.05, 2.83]	.032
Item 4 - Employed[d]												
Part-time	1.56	[0.86, 2.85]	.146	1.46	[1.05, 2.03]	.025	1.30	[0.74, 2.29]	.367	1.32	[0.67, 2.59]	.421
Not employed	1.37	[0.86, 2.16]	.181	1.68	[1.32, 2.16]	<.001	1.54	[0.99, 2.40]	.056	1.71	[1.03, 2.83]	.039
Item 5 - Residential instability[e]	1.36	[0.89, 2.08]	.157	1.75	[1.40, 2.19]	<.001	1.79	[1.20, 2.67]	.005	1.73	[1.08, 2.76]	.021
Item 6 - Illegal drug use 6 mo[f]	1.38	[0.88, 2.16]	.159	1.46	[1.13, 1.88]	.004	1.46	[0.94, 2.28]	.095	1.28	[0.78, 2.09]	.325
Item 7 - Severe drug use[g]	2.04	[1.07, 3.87]	.030	1.51	[1.14, 2.01]	.004	1.21	[0.71, 2.09]	.485	1.06	[0.54, 2.07]	.858
Time at risk	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	.001	1.00	[1.00, 1.00]	.015
County[h]												
County 2	0.18	[0.09, 0.34]	<.001	0.27	[0.19, 0.39]	<.001	0.37	[0.20, 0.67]	.001	0.25	[0.12, 0.53]	<.001
County 3	0.22	[0.10, 0.45]	<.001	0.23	[0.16, 0.34]	<.001	0.20	[0.10, 0.39]	<.001	0.29	[0.14, 0.61]	.001
County 4	0.26	[0.05, 1.27]	.096	0.94	[0.66, 1.33]	.725	1.44	[0.70, 2.96]	.323	2.07	[0.70, 6.17]	.191
County 5	0.58	[0.34, 1.00]	.052	0.39	[0.28, 0.55]	<.001	0.44	[0.27, 0.72]	.001	0.38	[0.19, 0.74]	.005

Note. OR = odds ratio; CI = confidence interval for odds ratio. [a]Item 1 reference: 33 or older. [b]Item 2 reference: No FTA warrants past 24 months. [c]Item 3 reference: Two or less prior jail incarcerations. [d]Item 4 reference: Yes, Full-time employment at time of arrest. [e]Item 5 reference: Lived at current residence past 6 months. [f]Item 6 reference: No illegal drug use during past 6 months. [g]Item 7 reference: No severe drug use problem. [h]Reference: County 1.

Table 8A. Logistic Regression Models of IRAS-PAT Items Predicting Any Arrest, by Race

Predictor	Any Arrest											
	Black			White								
	n = 688			Unweighted *n* = 2,847			Weighted *n* = 2,847			Stratified *n* = 689		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Item 1 - Age at first arrest[a]	1.48	[0.70, 3.16]	.306	1.69	[1.20, 2.38]	.003	2.35	[1.16, 4.75]	.017	1.96	[0.94, 4.09]	.072
Item 2 - Number of FTAs[b]												
1	1.38	[0.82, 2.32]	.226	1.95	[1.45, 2.63]	<.001	1.24	[0.71, 2.16]	.445	1.49	[0.78, 2.86]	.231
2 or more	1.19	[0.43, 3.25]	.740	2.09	[1.31, 3.34]	.002	2.15	[0.89, 5.21]	.089	1.08	[0.34, 3.41]	.899
Item 3 - 3+ prior incarcerations[c]	1.43	[1.00, 2.03]	.048	2.65	[2.18, 3.21]	<.001	3.17	[2.20, 4.55]	<.001	2.30	[1.52, 3.46]	<.001
Item 4 - Employed[d]												
Part-time	1.53	[0.94, 2.51]	.089	1.53	[1.17, 2.00]	.002	1.42	[0.89, 2.27]	.145	1.61	[0.94, 2.78]	.085
Not employed	1.64	[1.12, 2.40]	.011	2.10	[1.71, 2.58]	<.001	2.01	[1.36, 2.97]	<.001	1.95	[1.27, 2.98]	.002
Item 5 - Residential instability[e]	1.13	[0.79, 1.60]	.509	1.72	[1.42, 2.09]	<.001	2.06	[1.44, 2.93]	<.001	1.63	[1.09, 2.42]	.016
Item 6 - Illegal drug use 6 mo[f]	1.01	[0.70, 1.47]	.941	1.27	[1.03, 1.56]	.028	1.24	[0.84, 1.83]	.278	1.56	[1.03, 2.36]	.036
Item 7 - Severe drug use[g]	2.30	[1.34, 3.92]	.002	1.58	[1.24, 2.02]	<.001	1.53	[0.97, 2.44]	.069	1.14	[0.67, 1.97]	.626
Time at risk	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.01]	<.001
County[h]												
County 2	0.85	[0.54, 1.35]	.492	0.81	[0.60, 1.09]	.160	0.77	[0.46, 1.27]	.302	0.67	[0.39, 1.17]	.161
County 3	0.62	[0.37, 1.03]	.066	0.54	[0.39, 0.74]	<.001	0.61	[0.36, 1.04]	.068	0.64	[0.36, 1.13]	.122
County 4	0.14	[0.03, 0.67]	.014	0.87	[0.62, 1.21]	.408	1.05	[0.47, 2.35]	.906	1.49	[0.49, 4.50]	.479
County 5	0.57	[0.35, 0.93]	.025	0.57	[0.42, 0.77]	<.001	0.57	[0.36, 0.92]	.021	0.63	[0.36, 1.10]	.107

Note. OR = odds ratio; CI = confidence interval for odds ratio. [a]Item 1 reference: 33 or older. [b]Item 2 reference: No FTA warrants past 24 months. [c]Item 3 reference: Two or less prior jail incarcerations. [d]Item 4 reference: Yes, Full-time employment at time of arrest. [e]Item 5 reference: Lived at current residence past 6 months. [f]Item 6 reference: No illegal drug use during past 6 months. [g]Item 7 reference: No severe drug use problem. [h]Reference: County 1.

Table 9A. Unweighted Logistic Regression Models of Race and IRAS-PAT Items Predicting Pretrial Misconduct

Predictor	Unweighted								
	Any FTA			Any New Arrest			Any Arrest		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Block 1									
Black[a]	1.15	[0.85, 1.57]	.366	1.12	[0.88, 1.42]	.368	1.20	[0.98, 1.47]	.078
Item 1 - Age at first arrest[b]	2.56	[1.39, 4.71]	.003	1.30	[0.88, 1.92]	.187	1.71	[1.25, 2.33]	.001
Item 2 - Number of FTAs[c]									
1	2.02	[1.45, 2.80]	<.001	1.31	[0.97, 1.79]	.080	1.81	[1.40, 2.34]	<.001
2 or more	1.62	[0.98, 2.70]	.062	1.44	[0.90, 2.31]	.124	1.97	[1.29, 2.99]	.002
Item 3 - 3+ prior incarcerations[d]	1.81	[1.42, 2.30]	<.001	1.67	[1.37, 2.04]	<.001	2.28	[1.93, 2.69]	<.001
Item 4 - Employed[e]									
Part-time	1.11	[0.76, 1.63]	.577	1.47	[1.11, 1.96]	.008	1.50	[1.19, 1.91]	.001
Not employed	2.13	[1.64, 2.76]	<.001	1.56	[1.26, 1.94]	<.001	1.96	[1.64, 2.35]	<.001
Item 5 - Residential instability[f]	1.38	[1.08, 1.76]	.009	1.64	[1.34, 1.99]	<.001	1.58	[1.34, 1.87]	<.001
Item 6 - Illegal drug use 6 mo[g]	1.01	[0.77, 1.34]	.931	1.39	[1.12, 1.74]	.003	1.19	[0.99, 1.43]	.058
Item 7 - Severe drug use[h]	1.74	[1.27, 2.37]	<.001	1.62	[1.25, 2.09]	<.001	1.74	[1.40, 2.16]	<.001
Time at risk	1.00	[1.00, 1.01]	<.001	1.00	[1.00, 1.00]	<.001	1.00	[1.00, 1.00]	<.001
County[i]									
County 2	1.00	[0.65, 1.53]	.985	0.26	[0.19, 0.36]	<.001	0.82	[0.64, 1.05]	.116
County 3	0.89	[0.57, 1.40]	.620	0.25	[0.18, 0.34]	<.001	0.57	[0.44, 0.75]	<.001
County 4	1.82	[1.15, 2.88]	.011	0.94	[0.68, 1.29]	.706	0.83	[0.62, 1.13]	.233
County 5	1.77	[1.19, 2.63]	.005	0.44	[0.33, 0.58]	<.001	0.59	[0.46, 0.76]	<.001
Block 2									
Black X Item 1	0.39	[0.09, 1.64]	.201	3.70	[0.81, 16.79]	.090	0.83	[0.37, 1.90]	.665
Black X Item 2 - 1 FTA	0.88	[0.40, 1.91]	.742	1.19	[0.59, 2.43]	.623	0.75	[0.42, 1.36]	.349
Black X Item 2 - 2 or more FTAs	0.11	[0.01, 0.97]	.047	2.48	[0.79, 7.84]	.120	0.60	[0.20, 1.82]	.369
Black X Item 3	0.68	[0.37, 1.22]	.194	0.45	[0.28, 0.73]	.001	0.52	[0.35, 0.77]	.001
Black X Item 4 - Part-time	1.04	[0.42, 2.55]	.933	1.14	[0.58, 2.22]	.706	1.06	[0.61, 1.83]	.844
Black X Item 4 - Not Employed	0.96	[0.51, 1.82]	.908	0.83	[0.49, 1.38]	.463	0.79	[0.51, 1.20]	.268
Black X Item 5	0.79	[0.43, 1.44]	.435	0.73	[0.46, 1.17]	.195	0.67	[0.45, 1.00]	.048
Black X Item 6	0.76	[0.39, 1.46]	.407	0.90	[0.54, 1.50]	.697	0.81	[0.53, 1.23]	.318
Black X Item 7	0.94	[0.42, 2.08]	.870	1.13	[0.59, 2.15]	.720	1.39	[0.79, 2.42]	.251
Δ-2LL		13.11 (9)			19.23* (9)			22.72** (9)	

Note. *N* = 3,539. Δ-2LL reflects improvement in model fit upon addition of the interaction term(s) in Block 2. All model terms from Block 1 were included in Block 2; however, only unique terms are shown. OR = odds ratio. CI = confidence interval for odds ratio. [a]Reference: White. [b]Item 1 reference: 33 or older. [c]Item 2 reference: No FTA warrants past 24 months. [d]Item 3 reference: Two or less prior jail incarcerations. [e]Item 4 reference: Yes, Full-time employment at time of arrest. [f]Item 5 reference: Lived at current residence past 6 months. [g]Item 6 reference: No illegal drug use during past 6 months. [h]Item 7 reference: No severe drug use problem. [i]Reference: County 1. *p <.05. **p <.01. ***p <.001. (two-tailed)