**Evaluating Judicial Decision-Making and Court Appearance Outcomes Using A/B Analysis**

**Overview**

This project analyzed the effect of judicial decisions that contradict pretrial recommendations on the rate of Failure to Appear (FTA) in court. Using real booking data from 2020 to 2024, the goal was to determine whether judges who overrule pretrial detention recommendations impact public safety outcomes—specifically whether those defendants are more or less likely to miss court.

**Background & Business Context**

When someone is arrested, the pretrial process begins. One key step is when the probation department assesses the person using a tool called the Virginia Pretrial Risk Assessment Instrument (VPRAI). This tool evaluates the individual’s risk of missing court or committing another offense and generates a risk score from 0 to 9. Based on this score and other factors, a recommendation is made—to detain or release the person before trial.

However, the judge makes the final decision and can choose to either follow or override this recommendation. This project was designed to answer a simple but critical question:

*Do people released by judges against a recommendation to detain fail to appear in court more often than those released with a recommendation to release?*

**Data**

This analysis used real booking records from 2020 to 2024, including the following fields:

* **A Number** (Client ID)
* **Gender**
* **Race**
* **Age at Booking**
* **Booking Date**
* **VPRAI Score** (0–9)
* **Pretrial Recommendation** (Detain or Release)
* **Judge Followed Recommendation** (Yes/No)
* **Release Type** (Supervised/Unsupervised)
* **FTA** (Failure to Appear in court: Yes/No)

**Methodology**

This section outlines the steps taken to compare outcomes between two groups and assess whether judicial decisions that go against detention recommendations are statistically associated with higher court no-shows.

1. **Data Preparation**  
   Booking records from 2020 to 2024 were filtered and cleaned. Cases where individuals posted bail or had their cases dismissed were excluded to ensure a consistent comparison. Pretrial recommendations were categorized as either Detain or Release.
2. **Group Assignment**  
   Individuals were divided into two groups.
   * **Group A – Overruled Detain:** People who were recommended for detention, but the judge chose to release them anyway (either with or without pretrial monitoring supervision).
   * **Group B – Agreed Release:** People who were recommended for release, and the judge followed the recommendation.

By comparing these two groups, we can isolate the impact of a judge’s decision to override the recommendation to detain. Group sizes were analyzed to ensure similarity in demographics.

1. **FTA Rate Calculation**  
   For both groups, we calculated the Failure to Appear (FTA) rate—the percentage of people who missed their court date.
2. **Statistical Test – Chi-Squared Test of Independence**  
   To determine whether the difference in FTA rates between the two groups was statistically significant, we used the chi-squared test.
   * The chi-squared test helps us understand whether two categorical variables—in this case, judicial decision group and court appearance—are related.
   * The p-value from the test tells us how likely it is that the observed difference happened by chance. A low p-value (typically less than 0.05) suggests the difference is not random and likely reflects a real pattern in the data.
3. **Visual Analysis**  
   FTA data were also broken down by demographics and VPRAI score to identify additional patterns.

**Results**

The analysis revealed a strong relationship between judges overriding detention recommendations and increased FTA rates.

**FTA Rates**:

* + **Group A (Overruled Detain)**: 3043 individuals, 18.5% missed court
  + **Group B (Agreed Release)**: 2603 individuals, 9.5% missed court

This shows that people released against a detention recommendation were nearly twice as likely to miss court as those released in alignment with pretrial guidance.

**Statistical Test**:

* + **Chi-squared statistic**: 91.12
  + **p-value**: < 0.0001

Because the p-value is extremely low, we can say with high confidence that the difference in FTA rates is not due to chance. There is a statistically significant link between judicial decisions that contradict detention recommendations and a higher likelihood of individuals failing to appear in court.

**Conclusion and Key Findings**

This analysis highlights the real-world impact of judicial decisions that go against pretrial detention recommendations.

1. **Court Nonappearance Doubles When Detention Is Overruled**

* When judges agreed with pretrial release recommendations, about 1 in 10 individuals missed court.
* When judges overruled detention recommendations and released individuals, nearly 1 in 5 failed to appear.
* This suggests that pretrial recommendations, which are primarily driven from the VPRAI score, are trustworthy for reducing FTA and promoting court compliance.

1. **Risk Level Matters: VPRAI Score Drives the Pattern**

* The elevated FTA rate in Group A was mostly due to individuals with a VPRAI score of 5 or higher.
* Among individuals with VPRAI scores below 5, the judge’s decision to overrule detention did not show a significant increase in FTA.
* This underscores the importance of detaining individuals with scores above 4, where risk is clearly identified by the validated VPRAI tool.

1. **Implication for Judicial Practice**

* These findings support greater adherence to validated pretrial risk assessments—especially for high-risk individuals.
* Improving alignment between pretrial recommendations and judicial decisions may reduce missed court appearances and support safer pretrial practices.

**Visuals**

The charts below illustrate key patterns and findings from the analysis.

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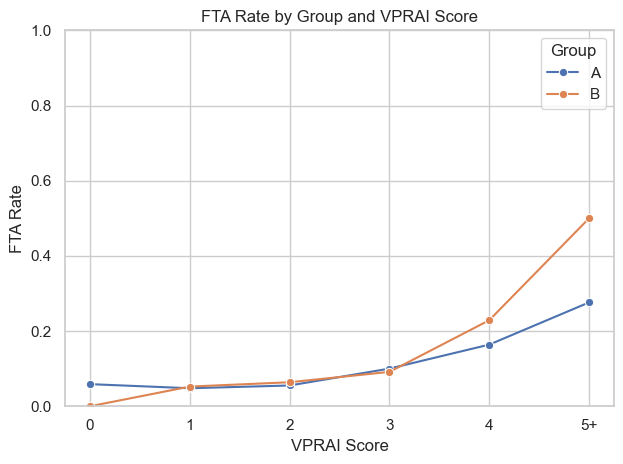
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