



Analysis of the COMPAS Recidivism Algorithm

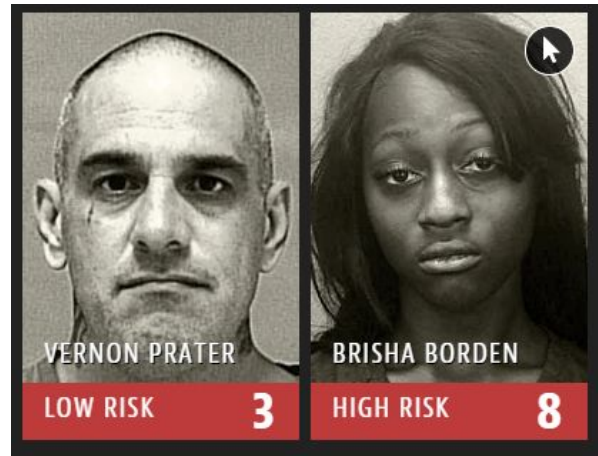
What is COMPAS?

- Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) is an assessment tool designed to predict risk of recidivism for criminal offenders
- Used throughout the country in decision-making by judges and probation/parole officers
- Includes general and violent recidivism risk scales



The Importance of a Non-Biased System

- Brisha Borden (Risk Score of 8) vs Vernon Prater (Risk Score of 3)
- In Arizona, Colorado, Delaware, Kentucky, Louisiana, Oklahoma, Virginia, Washington and Wisconsin, the risk scores are given to judges during criminal sentencing.





The Problem

- Machine learning is prone to bias and there is little support for the predictive validity of COMPAS
- We wanted to locate any potential bias in the data generated by the algorithm.
- Specifically, we targeted race
- COMPAS influences decisions regarding sentencing, parole, and bail allowances
- Are COMPAS risk scores fair?





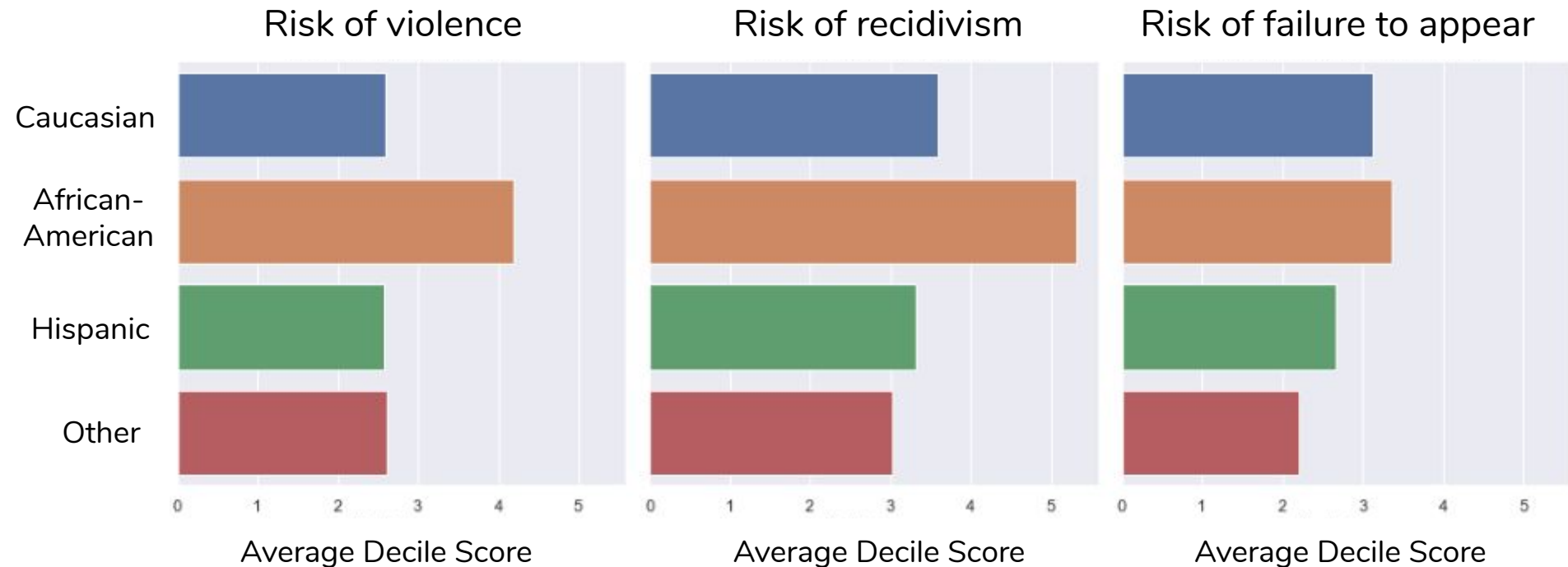
The Data

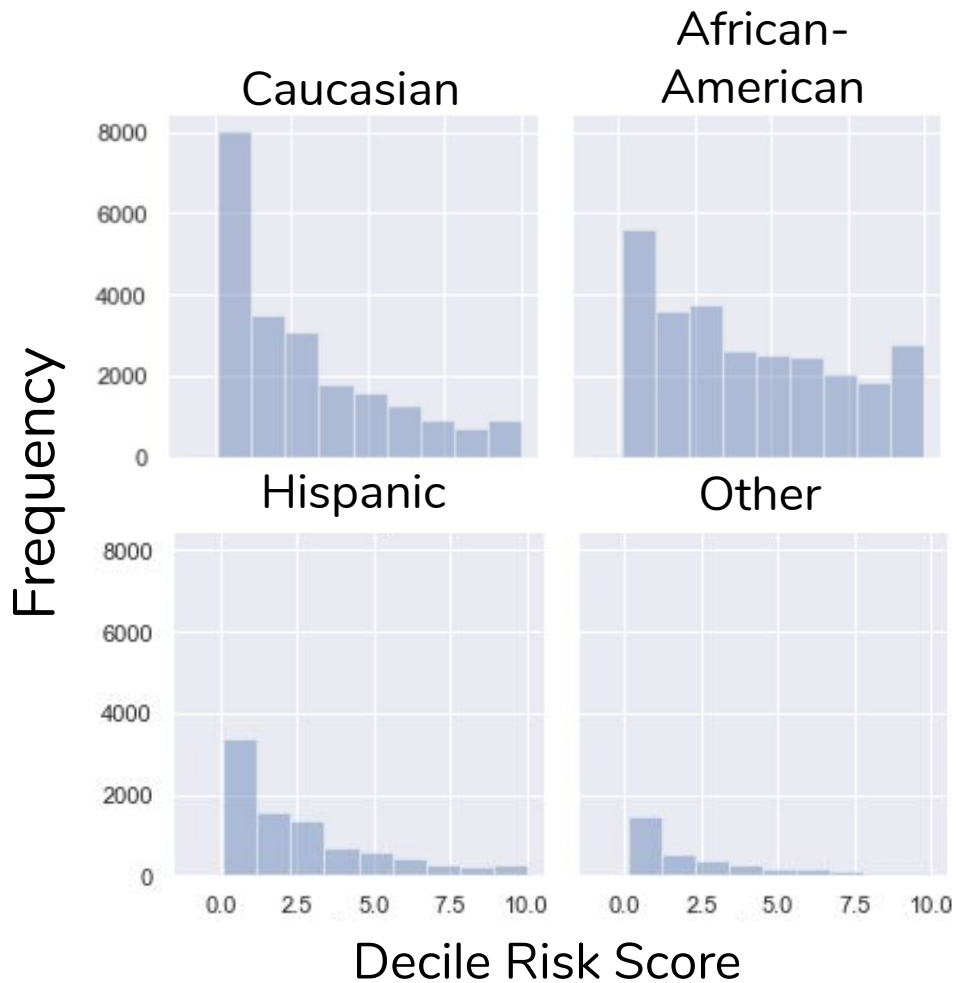
- Collected and published by ProPublica
- Includes criminal history, prison time, demographics, and COMPAS risk scores for over 10,000 defendants in Broward County, Florida from 2013 and 2014





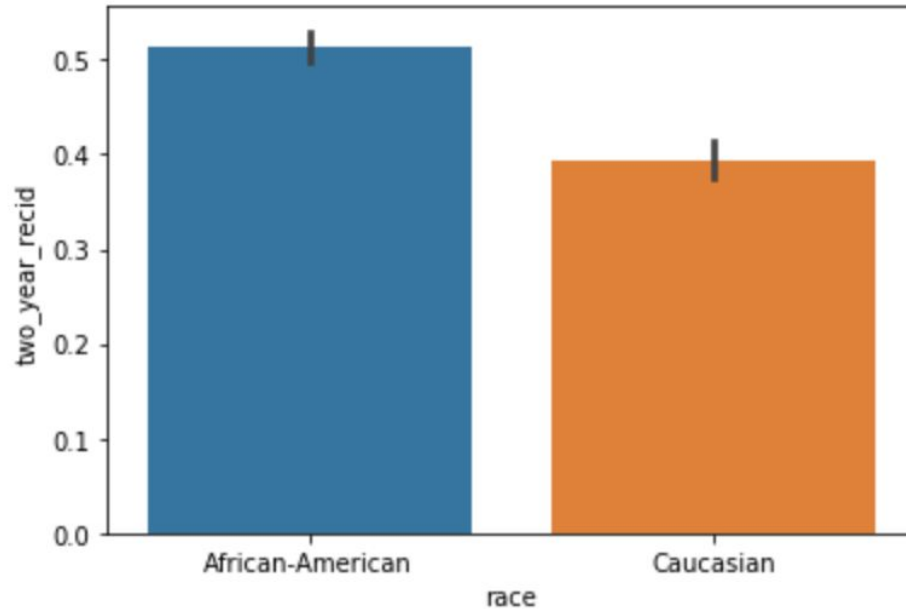
Risk Scores by Race







African Americans recidivate at a higher rate than Caucasians



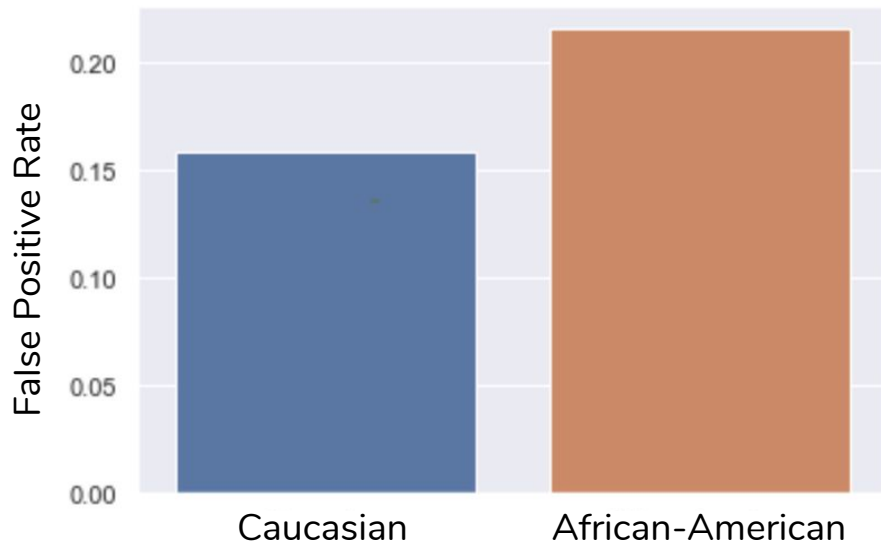
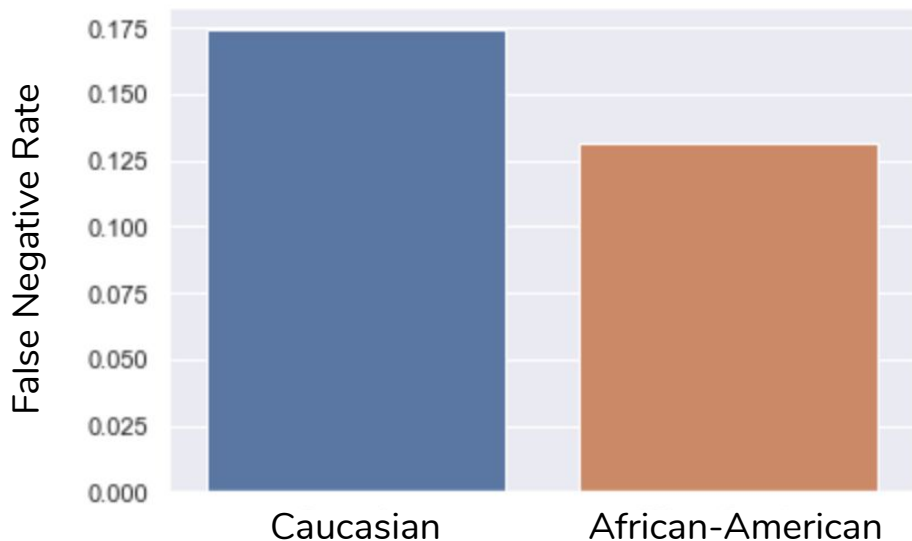


Predictive Models

- Ran a variety of models to predict whether convicts would recidivate within a two-year period
- For every ML model we used, **African Americans had a higher percentage of false positives** and **Caucasians had a higher percentage of false negatives.**

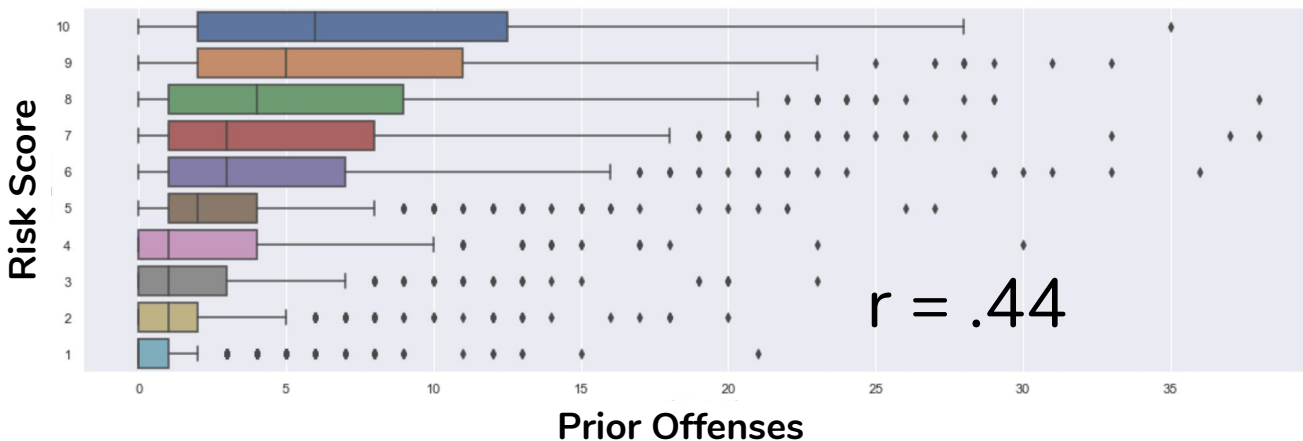
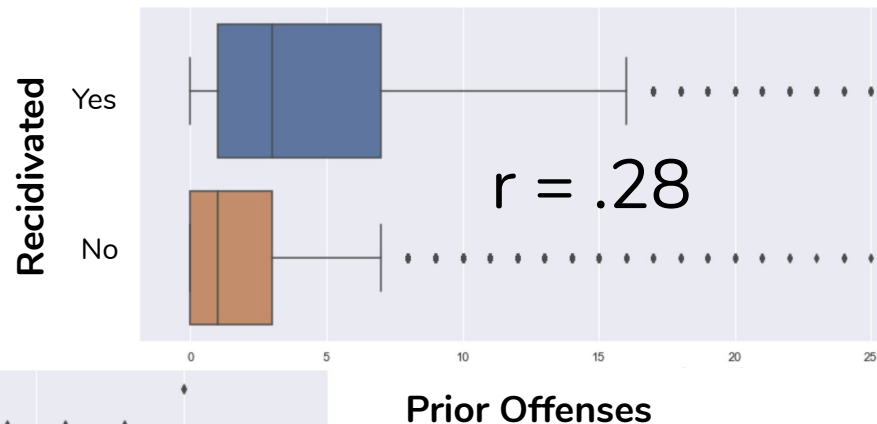


Risk Scores are Biased Against African-Americans



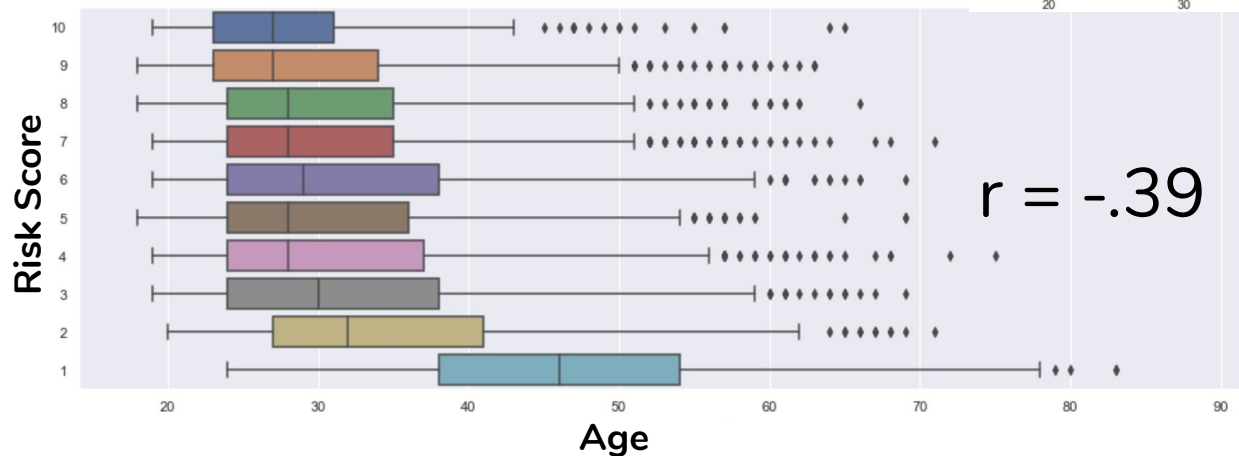
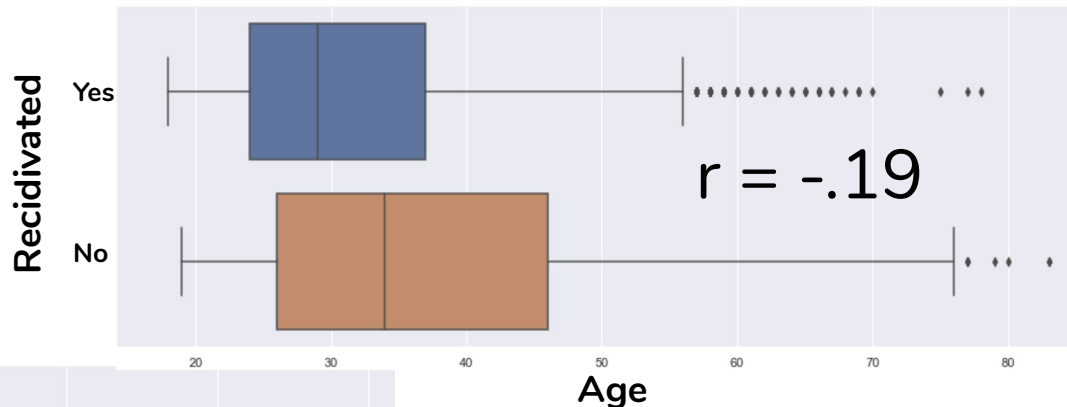
Are Risk Scores Disproportionately Affected by Prior Offenses?

COMPAS risk scores overestimate increase in recidivism according to number of prior offenses ($p = 0$).



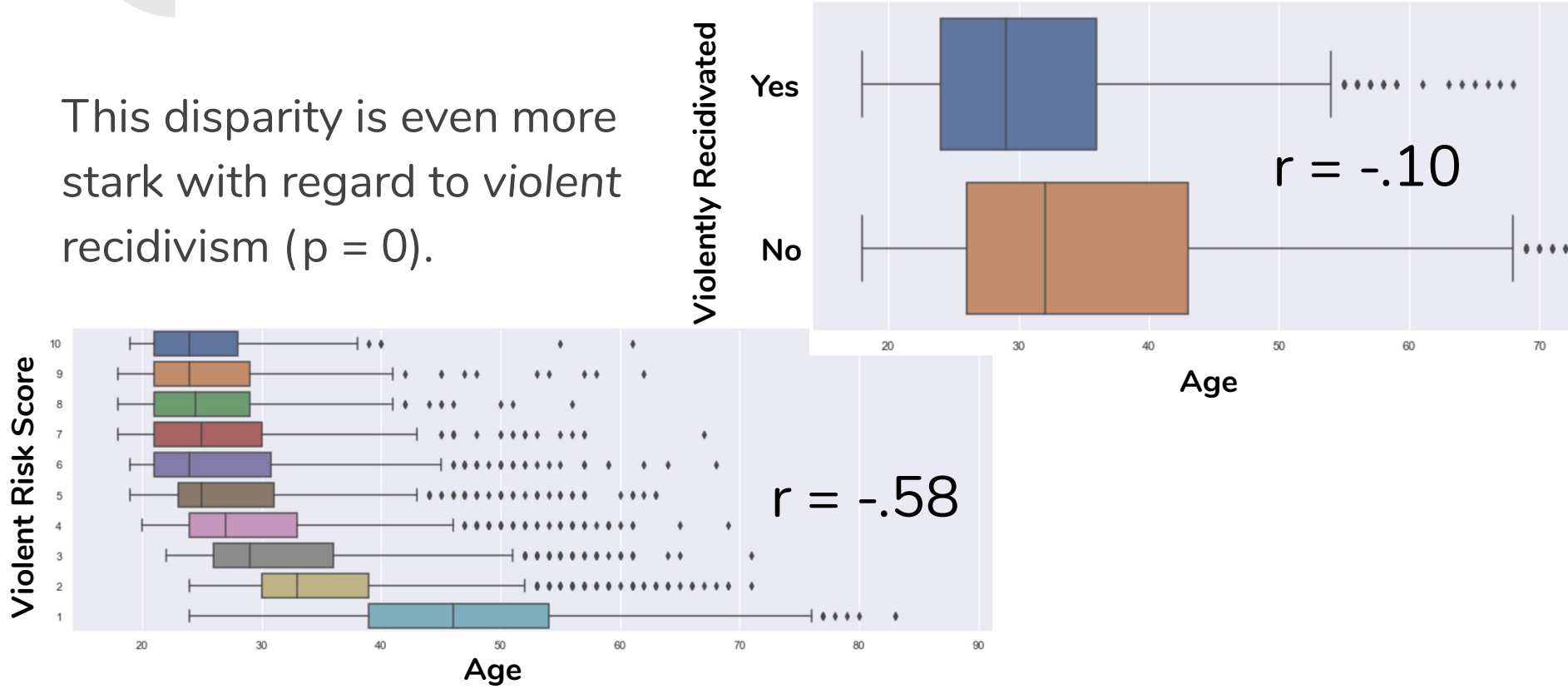
Are Risk Scores Disproportionately Affected by age?

COMPAS risk scores overestimate decline in recidivism with age ($p = 0$).



Are Violent Risk Scores Disproportionately Affected by age?

This disparity is even more stark with regard to violent recidivism ($p = 0$).





Risk Scores Reflect Undue Weight on Age and Prior Offense Count

	General			Violent		
	Risk Score	Recidivism according to our model	Actual recidivism	Risk Score	Recidivism according to our model	Actual recidivism
Age						
# Prior Offenses						

Moderate positive relationship

No relationship



Key Takeaways

Is COMPAS accurate?

61% of high risk convicts recidivated.

69% of low risk convicts did not recidivate.

Is COMPAS biased?

The algorithm is biased against African Americans.



Why Does it Matter?

- Machine learning could exacerbate existing injustices within the criminal justice system if not used carefully.
- Until algorithms like COMPAS are proven to perform consistently across demographic groups, they should NOT be incorporated into criminal justice decision-making processes.



Thank you!

<https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>

<https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm>

<https://github.com/propublica/compas-analysis/>