FINAL

May 11, 2022

BREAKING THE "PATTERN":

Recommendations for addressing racial bias in federal risk and needs assessment algorithms

Presentation to National Artificial Intelligence Advisory Committee (NAIAC) members, U.S. Commerce Secretary Gina Raimondo (Chair), and Attorney General Merrick Garland

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AGENDA

Problem Statement
Causes & Underlying Factors
Target Population
Harms & Costs of Inaction
Market & Government Failures
Legal & Regulatory Framework
Criteria/Alternative Matrix
Recommendations

The Problem

47% **black men falsely categorized** as high risk vs. 26% of white men.

(DOJ, 2021; Grawert, 2019; Stimson, 2020)

Racially-biased federal post-sentencing risk assessment algorithms, such as PATTERN, disproportionately predict that Black men will recidivate, resulting in extended prison terms, undermining the policy goals of rehabilitation and reinforcing the cycle of racially biased incarceration that leads to broader social inequities and government failure.

SOCIAL JUSTICE ISSUES WITH RISK ALGORITHMS

Post-sentencing risk assessment algorithms score prisoners on their recidivism likelihood, which informs early release.

Hypothetical Probabilities for Risks Based on Race

(Yang & Dobbie, 2020)

Cycle of Incarceration and Injustice

(Barkow, 2019)

(Demeter Foundation, 2020)

HARMS AND COSTS OF INACTION

NPV - Baseline Societal Costs
$14,043,875,438.70

SCOPE OF COSTS

- **Individual**
  Average Federal Prison Sentence is ~14 years
  - Communities
    - Cripples Economic Development
    - Weakens Social Connections
  - Family
    - Loss of Income
      Median income of $21,440 in 2021
    - Prison Expenditures
      $14,819 in Fees & Fines
- **Societal**
  FY2021 BOP Budget $7.85 billion
  - Individual Expenditures
    2021 Pop. 155,826
    - Support & Healthcare
    - Rehabilitation
  - Administration
    - FSA Implementation
      $75 million/year through FY 2023
    - Security, Facility Operations & Records
- **Social Welfare**
  - Healthcare
  - Education
  - Housing
  - Unemployment
    35% unemployment rate

(BOP, 2021.; BOP, 2022.; DOJ, 2021; Lewis & Lockwood, 2019; Rabuy & Kopf, 2015; The White House, 2022; USSC, 2021)

GOVERNMENT AND MARKET FAILURES

Government Failure: Current Risk Assessment Policy Undermines Rehabilitation Goals

While the government is focusing on equity in criminal justice, the failed policies have continued the racial disparities in prison, keeping the incarceration levels and recidivism high (Subramanian et al., 2020).

Market Failure: Negative Externalities

PATTERN's false positive leads to higher marginal societal costs than marginal societal benefits, leading to negative externality (Krugman & Wells, 2018)

LEGAL FRAMEWORK: A TIMELINE

1789 +

Constitution + Ammendments

(Yang & Dobbie, 2020)

1947

Federal Aquisition Regulation established

(FDIC, n.d.)

2018

First Step Act

(Federal Bureau of Prisons, n.d.)

1991

Networking and Information Technology Research and Development Program

(NITRD, n.d.)

2020

National Artificial Intelligence Initiative

(The National AI Advisory Committee, n.d.).

2022

Federal CIO Council - Algorithmic Assessment Tool

GHWUIRGJOEIRGJEOIRGJ

Criteria Alternatives Matrix

Four Alternatives:

1. Status Quo
2. Algorithmic Reform: Reweighing factors
3. Human Oversight: Review Board
4. Acquisition Reform: Bias Mitigation & Open Source Requirement

Equity	• Reduce racial disparities in risk scoring • Social Welfare
Economic Development	• Economic Growth • Government Costs/Savings
Political Feasibility	• Level of Institutional Support • Legal Authority
Sustainablity	• Ongoing Funding • Ongoing Accountability

ALTERNATIVE #1

ALGORITHMIC REFORM: REWEIGHING FACTORS

Increase the relative weight of dynamic factors to encourage rehabilitation, and decrease the weight of static factors, specifically criminal history, to correct for historical bias (Cyphert, 2020).

Based off of Hamilton et al., (2021)

ALTERNATIVE #2:

HUMAN OVERSIGHT: PRISONER APPEAL PROCESS

- Risk Assessment Review Task Force, to review case by case
- Analysis of nuances that assessments miss
- Training for individuals tasked with review

> The current plan appears to simply apply the current prisoner grievance system. **This is insufficient and inapplicable**, algorithmic risk assessment practices require their own process to challenge.

- Professor Melissa Hamilton, lead creator of PATTERN

ALTERNATIVE #3:

ACQUISITION REFORM: REQUIRE OPEN SOURCE & OPEN DATA

Given the high-stakes nature of DOJ systems, the department should set the bar for equitable and accountable algorithms by updating acquisition rules to require open source, open data, bias mitigation, and accountability (Bloch-Wehba, 2021).

Work with the CIO Council and GSA to **update DOJ's acquisition rules & the Federal Acquisition Regulation (FAR)**

Require bias mitigation, open source, and open data in new algorithms

Mandate for **regular independent audits** of all systems

Criteria Alternatives Matrix

		Status Quo	Algorithm Change	Appeal Process	Acquisition Reform	Weight
Equity	• Disparity Reduction • Social welfare	2 2	5 4	2.5 4	2 2	40%
Economic Development	• Economic Growth • Government Costs/Savings	1 1	4 3	3 2	2 3.5	30%
Political Feasibility	• Institutional support • Legal Authority	5 5	3 2	4 5	4 3	20%
Sustainablity	• Funding • Accountability	3 4	5 5	2 2	3 5	10%
Total	(out of 10)	**4.9**	**7.7**	**6.3**	**5.5**	100%

RECOMMENDATION & NEXT STEPS

Plan

1. Commission Updated PATTERN Algorithm prioritizing fairness & rehabilitation
2. Partner with CIO Council and GSA to develop open source and open data guarantees for the new algorithm
3. Conduct retro-active analysis to determine impact of new model
4. Pilot the new model with select inmates for RCT study

Timeline

PROJECTED OUTCOMES

Current Benchmarks

- 47% False Positive for Black Men vs. 26% for White Men
- 1.42:1 Ratio White Men to Black Men Categorized as "Low Risk" and eligible for early release.

Performance Metrics

- # of False Positives for Black Men
- # of Prisoners Participating in Rehab Programs
- Change in risk scores in aggregate for Black men

Outcomes

- Fewer disparities in access to re-entry programs for Black Men
- New benchmarks for assessing racial disparities
- Model for new algorithm development

Appendix

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STRATEGIES

Logic Model

INPUTS

- First Step Act of 2018 Requirements (James, 2019)
- Risk Assessment Algorithm best practices (Hamilton et al., 2021)
- $375 million over five fiscal years (James, 2019)

ACTIVITIES (HAMILTON ET AL., 2021)

- NIJ Listening Sessions
- PATTERN Development

OUTPUTS (HAMILTON ET AL., 2021; JAMES, 2019)

- PATTERN Algorithm
- Risk levels assigned to federal inmates
- More intelligent decision-making capabilities
- Appropriate allocation of federal resources to reduce recidivism

OUTCOMES (JAMES, 2019)

- Reduced recidivism among federal inmates
- Reduced federal prison populations
- Reduced federal prison expenditures

IMPACT

- Improved mental health
- Increased and strengthened familial ties
- Improved communities

LONG TERM COSTS OF INACTION

	Cost of Excess Prisoners	Loss of Black Male Householder Income	Baseline Long-Term Societal Costs
Future Value	$ 14,791,400,301.70	$ 911,582,008.65	$ 15,702,982,310.34
NPV	$9,464,534,255.02	$4,579,341,183.68	$ 14,043,875,438.70

Discount Rate	3.23%

Note: Extrapolated from federal racial disparity in sentencing data from Rehavi and Starr (2014) showing there are 8,000 additional Black male federal prisoners per year, Black male householder median income data from the U.S. Census Bureau (n.d.), the cost of incarcerating one person from the Bureau of Prisons (2021), and the Black male lifetime earnings loss from being incarcerated detailed in Gordon & Neelakantan (2021).
Link to spreadsheet: https://uscedu-my.sharepoint.com/:x:/g/personal/bdjacob_usc_edu/EXsFCD4_T-hNji7TDXBBi_sBXlYg8VVerGhA6mFTjNQtxA?e=lDg8km

WHY IS IT A BIG DEAL?

WHO IS AFFECTED? TARGET POPULATION

Black men are about 13 percent of the male population, but about 35 percent of those incarcerated (Hinton, 2018)

Black males are incarcerated five times more than White males (Jones, 2020)

1,501 black prisoners for every 100,000 black adults (Gramlich, 2020)

By the age of 35, 50% of unemployed Black males have been arrested, and 25% have been incarcerated (Bushway et al., 2022)

7% of Black people classified as a minimum level risk compared to 21% of white people (Johnson, 2022)

“The Missing Variable Problem"

(Partnership for AI, 2019)

Figure 4: Omitted Variable Bias in a Simple Insurance Model

Solid lines indicate causal variables, boxes indicate variables that are measured in the training dataset, ellipses indicate variables that were not measured, and the dotted line indicates the prediction that is made by the final trained model.

CRITERIA / ALTERNATIVES FINDINGS

Indicator Key

Criteria	Indicator	Scale
Equity	Reduce racial disparities in risk scoring	low score would be 30/1 high score would be 1/1
	Social Welfare	low score - no benefit to society, continued disparity in society. high score would be maximum benefit to society, no disparties in society
Economic Development	Economic Growth	low score - harms economic growth and high score, contributes greatly.
	Government Costs/Savings	low score - higher costs than savings, high score - make money, significant savings
Political Feasibility	Level of institutional support	low score - not sticky, High score sticky
	Legal Authority	low score - no legal authority, requires external approvals, high score - full executive discretion
Sustainability	Funding	low score - no budget currently and/or high budget required. high score - budget exists or low budget required
	Accountability	low score - opaque/closed private. high score open source, totally transparent process

Bias Management Framework

(Ntoutsi et al., 2020)

CAM Support

Status Quo

Equity	Economic Development	Political Feasibility	Sustainability
Equal ratio of recidivism classifications in black vs. white men Social Welfare	Economic Growth Government Costs/Savings	Level of institutional support Legal authority	Funding Accountability
The DOJ's 2021 report reviewing and revalidating the tool demonstrated large disparities for people of color. Specifically, it overpredicted the general recidivism rate for Black American men at higher rates than for White American men. Moreover, it's estimated that at least 14,000 people were categorized incorrectly by the tool (NIJ,2021; Johnson, 2022). The average cost of federal incarceration per inmate in federal prison (2020): $39,158 ($120.59 per day). The average annual COIF for a Federal inmate in a Residential Reentry Center for FY 2020 was $35,663 ($97.44 per day) (BOP, 2021). As of May 5, 2022, there were 156,558 total federal inmates (BOP, 2022).	Even if one were to exclude the cost of jail, the aggregate burden of incarceration would still exceed $500 billion annually (McLaughlin et al., 2016). In 2020, WH sought nearly $300 million to fund improvements related to the law, of which only $23 million was earmarked for programming. (Cyphert, 2020; Grawert, 2020). For every dollar in corrections costs, incarceration generates an additional ten dollars in social costs. More than half of the costs are borne by families, children, and community members who have committed no crime (McLaughlin et al., 2016).	The First Step Act (FSA) was signed into law on December 21, 2018. On July 20, 2019, 210 days after the passing of the FSA, PATTERN was implemented in Federal prisons. Since the FSA's implementation of the new system, 3,100 people have been released, 3,000 have been resentenced to shorter terms and 2,800 may become eligible for early release once "good time" credits are applied (Grawert, 2020; Benner, 2022). Additionally, BOP has admitted it's concerned about the racial and ethnic differences that affect PATTERN's predictions of risk for recidivism and researchers echo their sentiments (NIJ, 2021; Cyphert, 2020; Santos, 2022; Hamilton et al., 2021). Because it continues to present flaws the DOJ plans another overhaul of the tool and is working with consultants to make the tool fairer (Johnson, 2022).	Specific costs related to the creation of PATTERN are unavailable. It's understood that the FSA authorized $75 million a fiscal year for the first five years. 80% to be directed to BOP for implementation of the initiatives (Grawert, 2020). BOP needed to find the first $75 million from the budget until the Consolidation Appropriations Act's passage in 2019 which included full funding of FSA through the current fiscal year. These funds may not be enough. A member of the Independent Review Committee (committee mandated by the FSA) believes full implementation of FSA may take closer to $300 million. FSA mandated an Independent Review Committee as part of the system. The committee consists of outside experts to advise and assist the government with implementing the law and to develop and publicly release a risk and needs assessment system. PATTERN is reviewed and revalidated by an IRC annually. The cost of the review is unknown (DOJ, 2020).

CAM Support

Algorithmic Reform: Reweighing Factors

#1- Reweight Algorithm	Criteria	Score	Rationale
Equity	Reduce racial disparities in	5	Since criminal histories and age can be proxies for race, by rebalanced towards non-static, dynamic, rehabilitory factors, fewer Black men should be automatically classified as higher risk (or not low risk) (Hamilton et al., 2022; Brennan Center; 2020)
	Social Welfare	4	Lower risk and a more "productive" scoring system should reduce time spent in prison, bettering the individual and the protected class' social welfare. But there also a risk of increased crime — this is the "trade-off" that undermines the social welfare outcomes. (Cyphert, 2021; NIST, 2022)
Accountability	Economic Growth	4	Research shows that successfully reintegrated felons can contribute to the economy, but current assessment mechanisms do not track income (O'Neil, 2016).
	Government Costs/Savings	3	Post-release expenses are similar to incarceration expenses, suggesting a limited cost savings. Moreover, effective risk assessments and programming to match may require additional resources for rehabilitation (Barkow, 2019).
Economic Development	Level of institutional suppor	3	The administration and Congress have signaled a commitment to reducing bias in algorithms, but Congressional action has been limited (Winters, 2022)
	Legal Authority	2	Explicitly using race within an algorithm faces political and constitutional challenges, as seen in the move away from affirmative action in college admissions, suggesting this change swiftly demand a court case. That said, given the use of weights for *all persons* not just Black may avoid some issues due to equal treatment (Harcourt, 2015).
Sustainability	Funding	5	Additional funding for the PATTERN 2.0 model would be minimal (~$1M) (Grawert, 2019).
	Accountability	5	Regular audits are already past of the system, and an CIO Council approved acquisition should support further accountability (CIO Council, 2022)
	Total	**7.7**	

CAM Support

Alternative 2 - Risk Assessment Review Task Force

Do CAM + Slides + Script for Monday night + handout - assign numbers based on data

Implementing a process to challenge the outcome could introduce bias from the task force. It could also give an opportunity to reward cooperation and potetial (Santos, 2021).

Beneficial for society to improve social welfare, families do better when they are not in prison, though they continue to have challenges, being in prison is most challenging (Comfort, 2016).

It will be very easy to audit the outcomes, using a paper trail to evaulate the impact. Established best practices exist in most states and Englad as an example. (National Audit Office investigation into the Parole Board, 2017) and (Massachusetts Auditor: 'Audit of Massachusetts Parole Board', 2021)

The process should be transparent, as far as how to challenge, and open records, but when discretion comes into play, that's when the transparency becomes a little cloudy. No established standards (Tonry, 2014).

CAM Support

Alternative 2 - Risk Assessment Review Task Force

Helps economic growth slightly to release prisoners, as they can contribute to society. increased economic output for target populations, and greater fairness in the range of government services utilizing AI (House Committee on the Budget, 2020).

Slightly higher costs to keep someone incarcerated than to rehabilitate. (Annual Determination of Average Cost of Incarceration Fee, 2021)

First Step Act was a bipartisan bill, any updates to PATTERN should be widely accepted. (Cyphert, 2021)

Could not find funding, and would need funding for task force to pay for 20 staff members to manage the backlog of 14K challenges, 2 million, which shouldn’t be hard to find, insignificant in comparison to overall budgets.

CAM Support

Alternative 3 - Procurment Reform

Top Criteria Weights in PATTERN

(Hamilton et al., 2021)

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