CENTRE FOR
SOCIAL DATA ANALYTICS

Government by Algorithm?

A Case Study of Predictive Analytics in Child Protective Services

Rhema Vaithianathan
September 2017

AUT UNIVERSITY
NEW ZEALAND

Research Team

- Rhema Vaithianathan, Auckland University of Technology
- Emily Putnam-Hornstein, University of Southern California
- Erin Dalton, Allegheny County
- Alex Chouldechova, Carnegie Mellon University

Agenda

- Discuss the use of predictive risk modelling in child protection in the US
- Contrast with use in Criminal Justice
- Outline why there is more community acceptance in child protection

Predictive Risk Models *[algorithms]*

- Automatic risk scoring tool which generates a risk score for an adverse event based on large administrative dataset
- Uses data collected by Governments as part of its business process to identify individuals who will have a bad outcome

Background

Children in the Public Benefit System at Risk of Maltreatment

Identification Via Predictive Modeling

Rhema Vaithianathan, PhD, Tim Maloney, PhD, Emily Putnam-Hornstein, PhD, Nan Jiang, PhD

Abstract: A growing body of research links child abuse and neglect to a range of negative short- and long-term health outcomes. Determining a child's risk of maltreatment at or shortly after birth provides an opportunity for the delivery of targeted prevention services. This study presents findings from a predictive risk model (PRM) developed to estimate the likelihood of substantiated maltreatment among children enrolled in New Zealand's public benefit system. The objective was to explore the potential use of administrative data for targeting prevention and early intervention services to children and families.

A data set of integrated public benefit and child protection records for children born in New Zealand between January 1, 2003, and June 1, 2006, was used to develop a risk algorithm using stepwise probit modeling. Data were analyzed in 2012. The final model included 132 variables and produced an area under the receiver operating characteristic curve of 76%. Among children in the top decile of risk, 47.8% had been substantiated for maltreatment by age 5 years. Of all children substantiated for maltreatment by age 5 years, 83% had been enrolled in the public benefit system before age 2 years. This analysis demonstrates that PRMs can be used to generate risk scores for substantiated maltreatment. Although a PRM cannot replace more-comprehensive clinical assessments of abuse and neglect risk, this approach provides a simple and cost-effective method of targeting early prevention services.

(Am J Prev Med 2013;45(3):354–359)

2013, American Journal of Preventive Medicine, 45(3)

Obstacles

Children 'not lab-rats' - Anne Tolley intervenes in child abuse experiment

STACEY KIRK

Last updated 05:00, July 30 2015

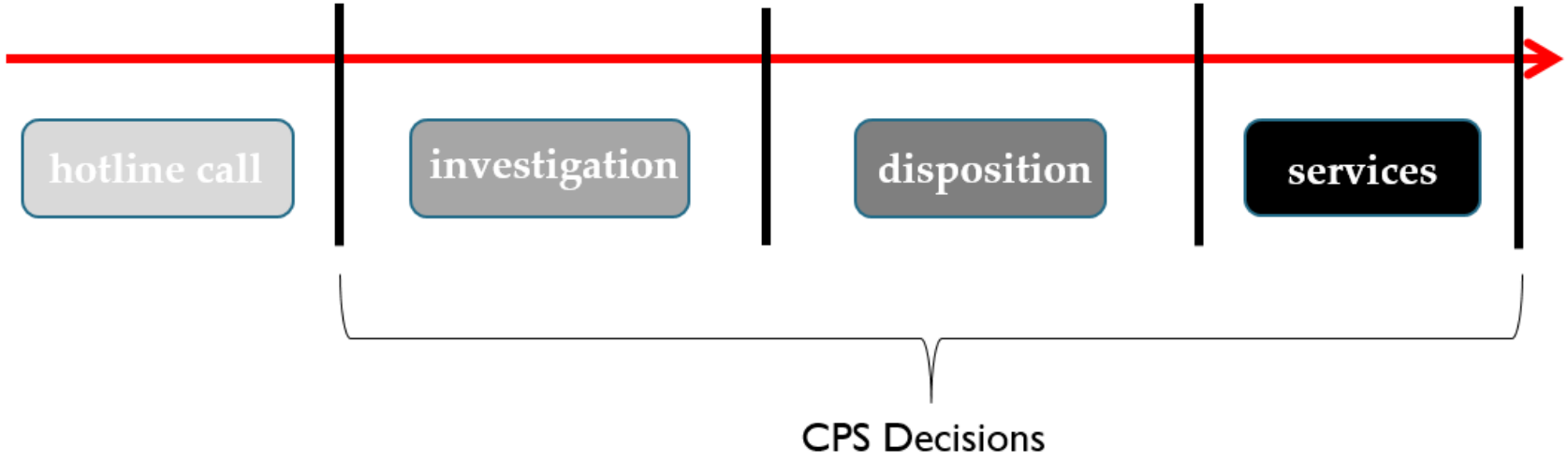
ROSS GIBLIN/FAIRFAX NZ

US: Child Protection Overview

The Problem

- 3.6 million referrals of abuse and neglect every year
- 1 in 3 US children experience an investigation by age 18
- 1 in 7 US children are substantiated as victims

Current Practice



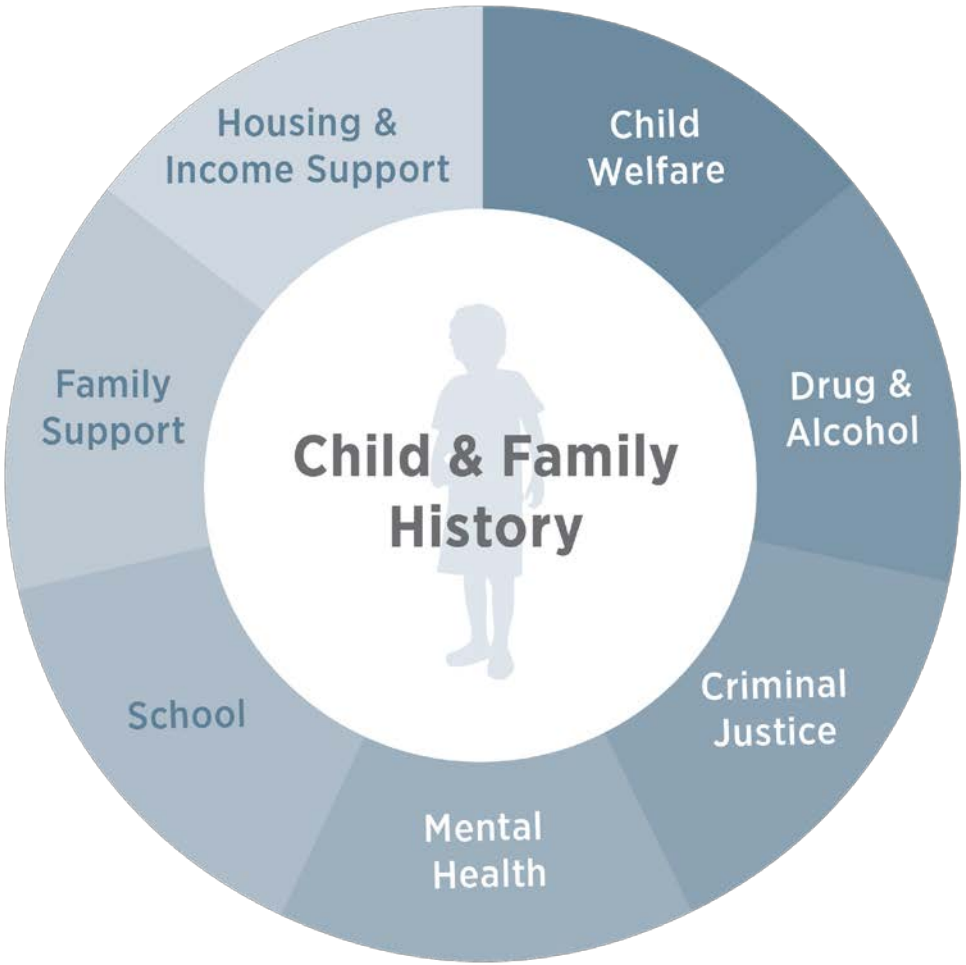
A New Approach

Allegheny County, PA, US

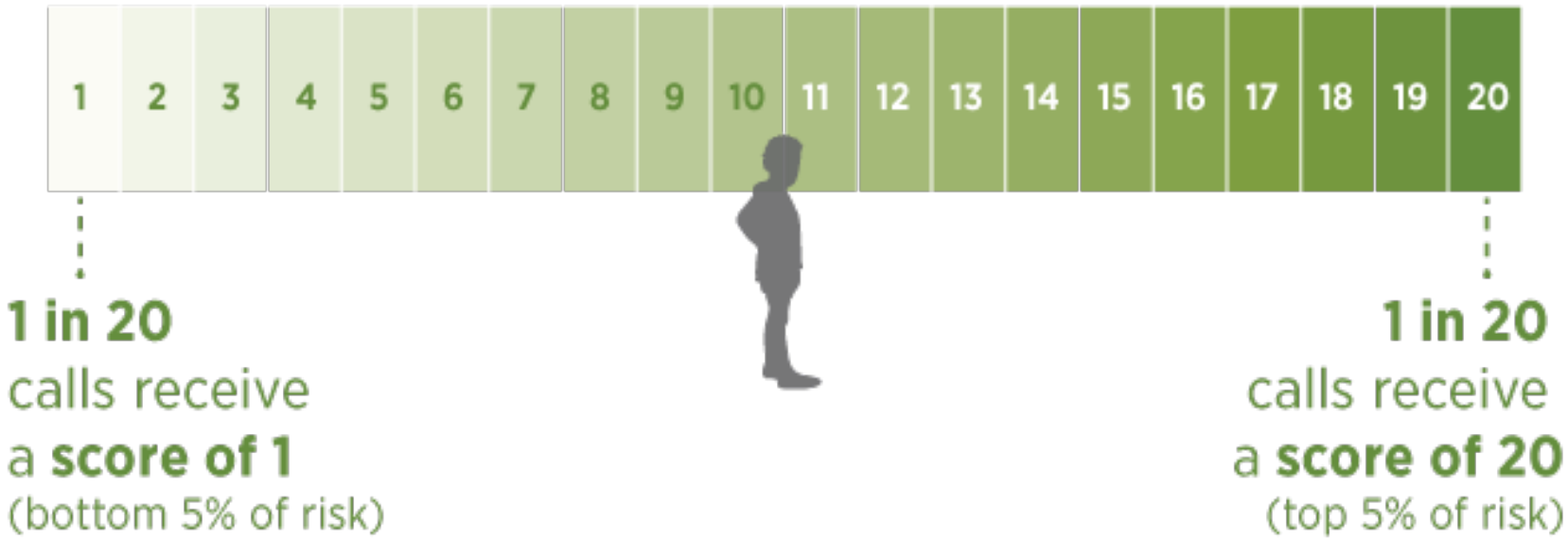
14,121
Referrals to Child Welfare

53%
Screened Out

47%
Screened In



Score tells us the risk that the child will be removed from home in 2 years and placed in foster care…



1 in 100 children

who received **a score of 1 were placed out-of-home** within 2 years of the call

1 in 2 children
who received
a score of 20 were placed
out-of-home within
2 years of the call

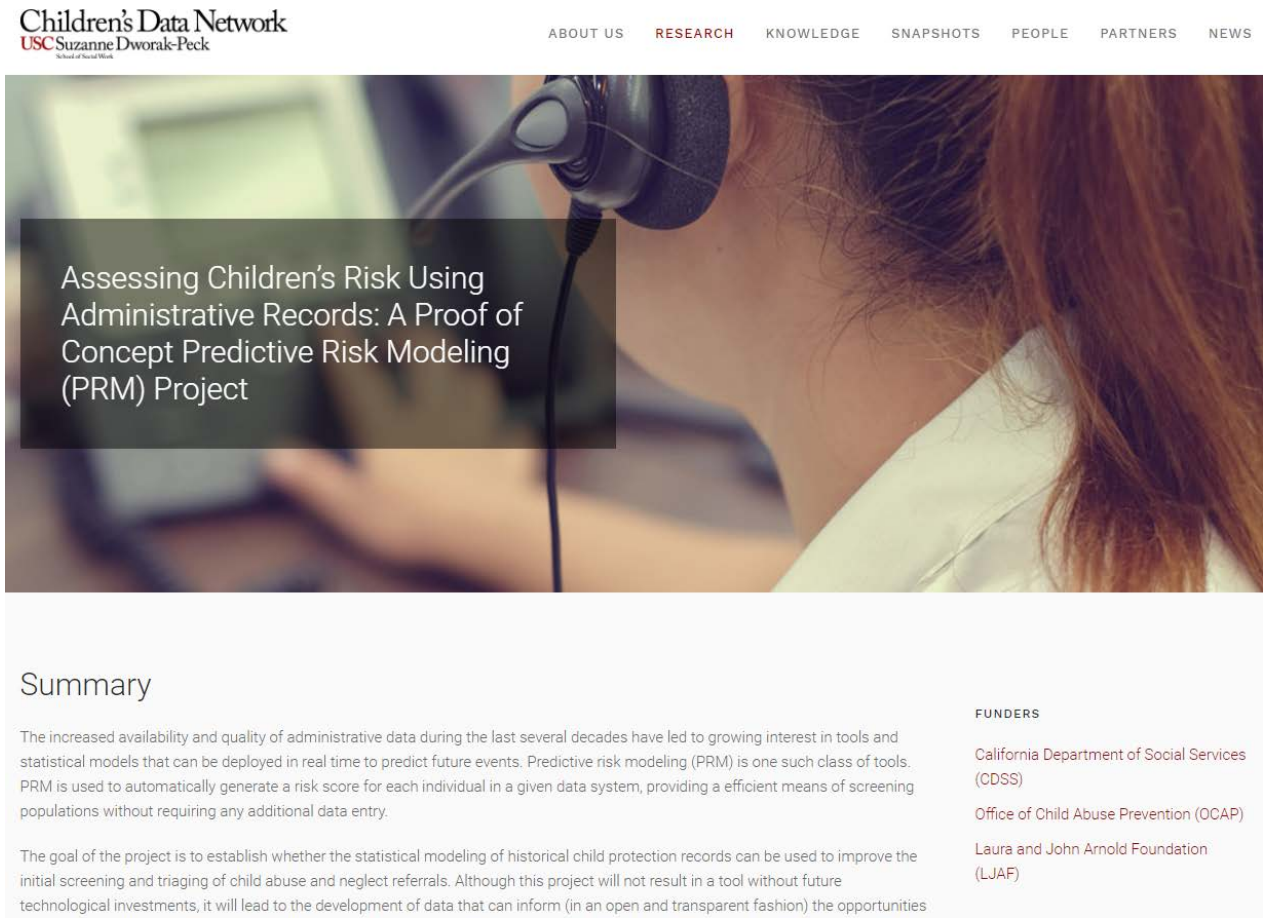
Injury Validation

Score of 20 versus 1?

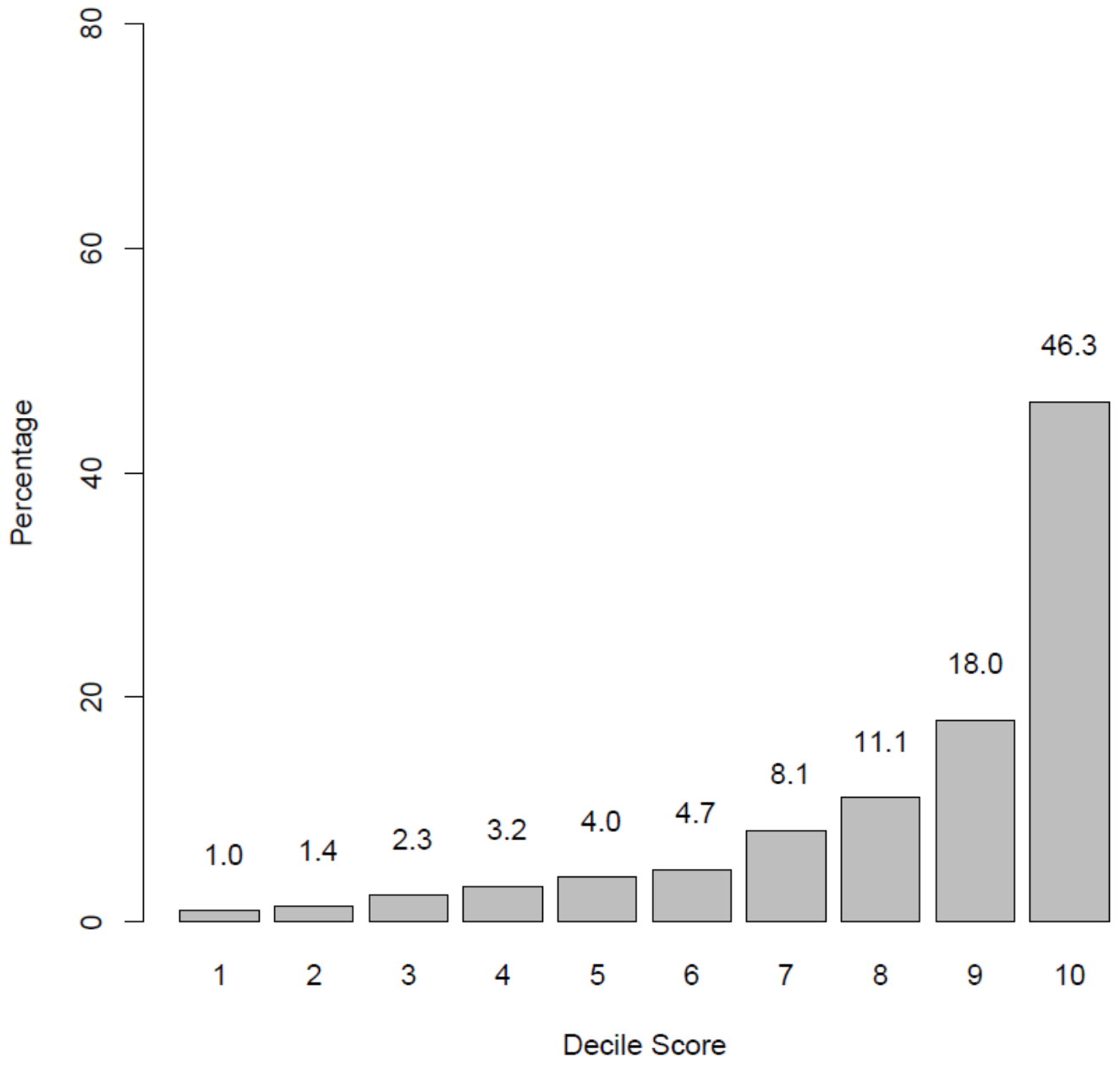
- 21 times more likely to be admitted for a self-inflicted injury
- 17 times more likely to admitted for physical assault

California

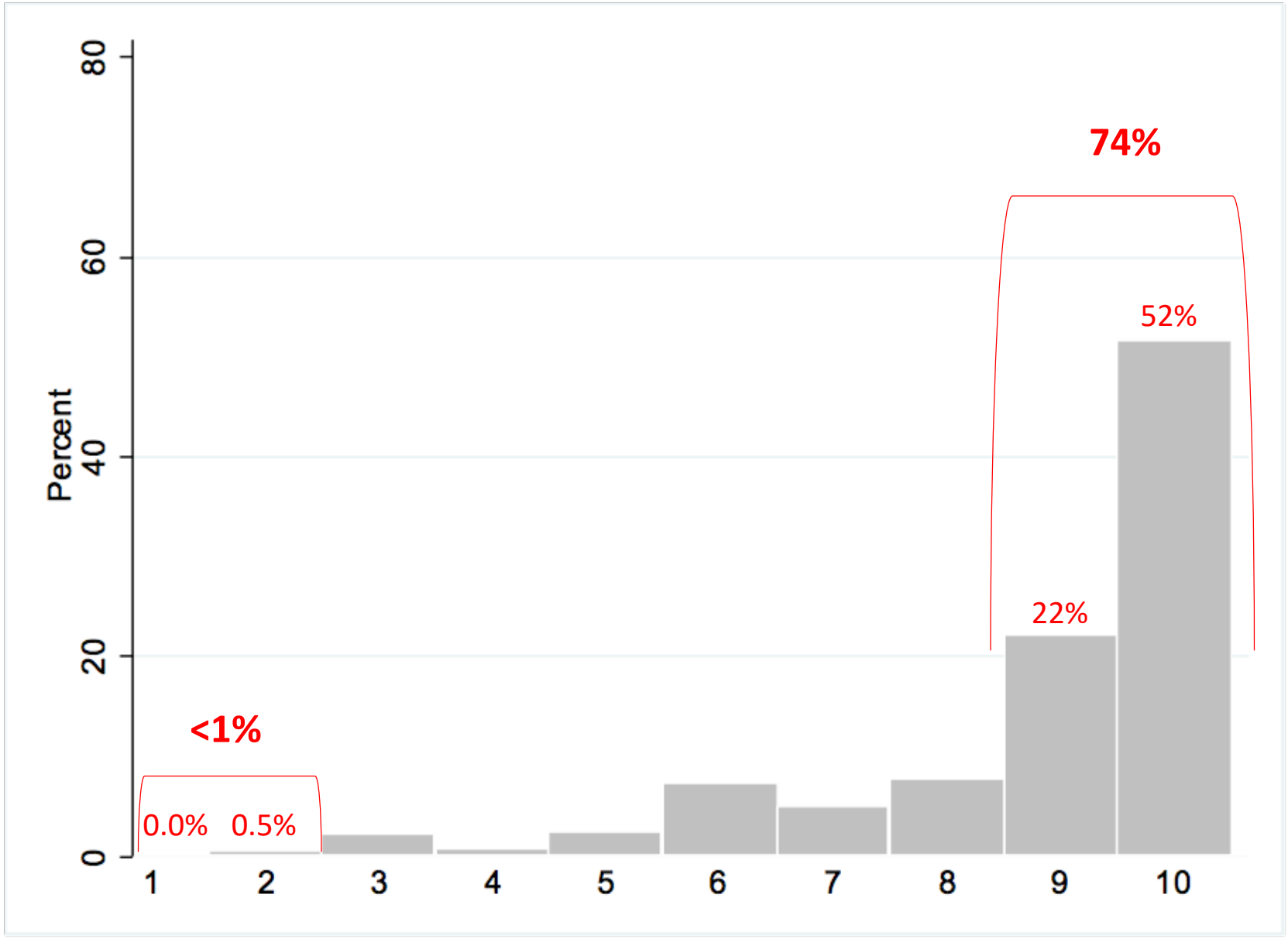
Single data source…



*Percentage of child/referral events in each decile with the child **placed in foster care** within 24 months*
(state average: 10%)



External Validation *[preliminary]*



Maltreatment Near-Fatalities & Fatalities among children under 5 years

Criminal Justice Use Case

Releasing prisoners on bail

- US has the highest incarceration rates in the world
- The majority of people in jail have not been convicted but are awaiting trial
- Use of predictive risk models to help judges decide whether to release prisoners on bail
- Predicts if prisoner will recidivate
- Use is found to be racially biased

Bernard Parker, left, was rated high risk; Dylan Fugett was rated low risk. (Josh Ritchie for ProPublica)

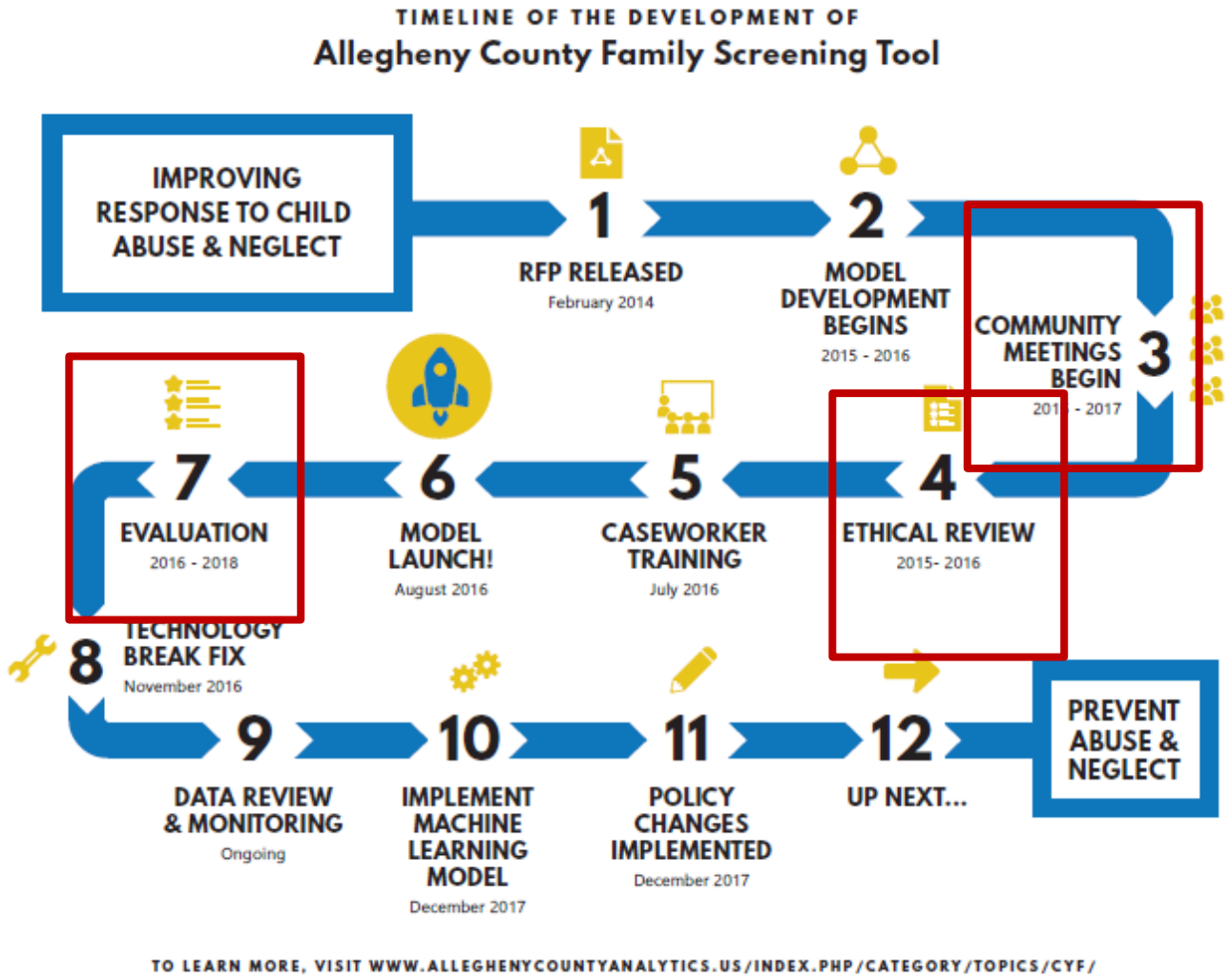
Source:
Julia Angwin,
Jeff Larson,
Surya Mattu and
Lauren Kirchner, *ProPublica*

Machine Bias

There's software used across the country to predict future criminals. And it's biased against blacks.

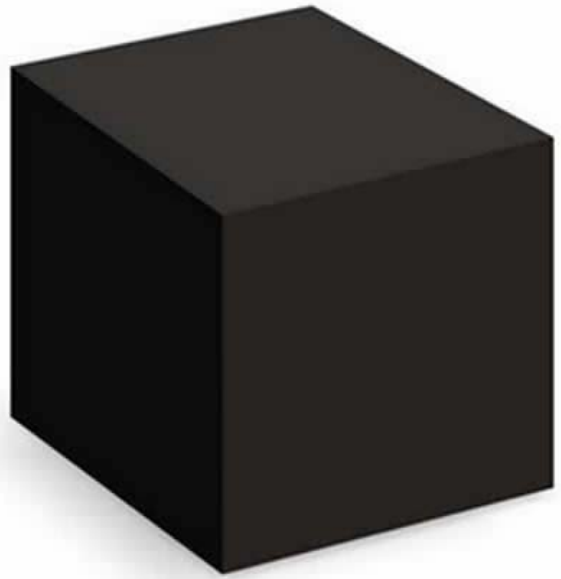
Contrasting Allegheny Case vs. Criminal Justice Case

CAREFUL IMPLEMENTATION

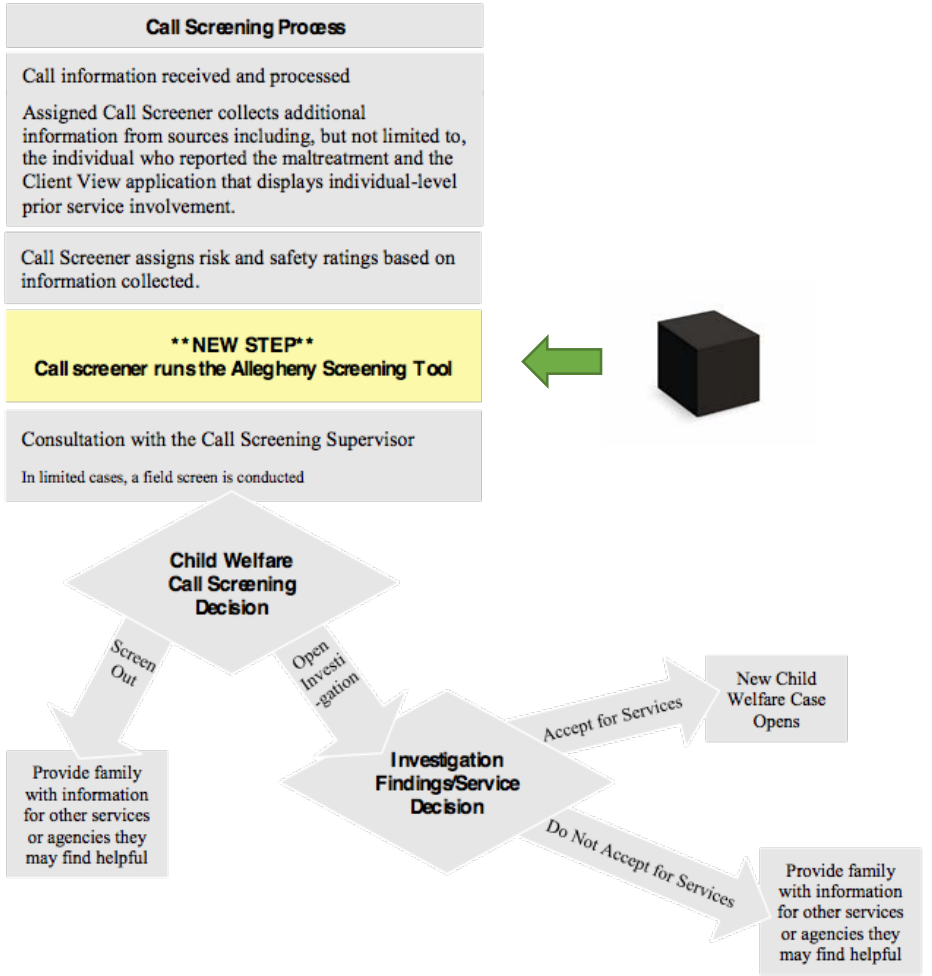


EMPHASIS OF HUMAN IN THE DECISION LOOP

This is **not** your new process



This is the process



TRANSPARENCY

" only one of the jurisdictions, Allegheny County, was able to furnish both the actual predictive algorithms it used (including a complete list of factors and the weight each factor is given) and substantial detail about how they was developed"
(page 26)

ALGORITHMIC TRANSPARENCY FOR THE SMART CITY

by Robert Brauneis and Ellen P. Goodman*

"As a society, we are now at a crucial juncture in determining how to deploy AI-based technologies in ways that promote, not hinder, democratic values such as freedom, equality, and transparency."[1]

ABSTRACT

Emerging across many disciplines are questions about algorithmic ethics – about the values embedded in artificial intelligence and big data analytics that increasingly replace human decisionmaking. Many are concerned that an algorithmic society is too opaque to be accountable for its behavior. An individual can be denied parole or denied credit, fired or not hired for reasons she will never know and cannot be articulated. In the public sector, the opacity of algorithmic decisionmaking is particularly problematic both because governmental decisions may be especially weighty, and because democratically-elected governments bear special duties of accountability. Investigative journalists have recently exposed the dangerous impenetrability of algorithmic processes used in the criminal justice field – dangerous because the predictions they make can be both erroneous and unfair, with none the wiser.

2017, Yale Journal of Law & Technology, Forthcoming

Conclusion

- Next steps - implementing an algorithm at birth to predict which child will be notified to child protection

Connect with us

www.csda.aut.ac.nz

Twitter
@AUTCSDA
@rvaithianathan

LinkedIn
AUT Centre for Social Data Analytics