[Predictive Policing for Reform? Indeterminacy and Intervention in Big Data Policing](https://ojs.library.queensu.ca/index.php/surveillance-and-society/article/view/10410/8735)

* “Julia Angwin et al. (2016) found that an algorithm used to determine bail was more likely to flag African American defendants as “high risk” than white defendants.
* Bias inherent in machine learning algorithms and AI has been mainstream for years
* In the context of law enforcement and ‘predictive policing’ applications, the focus has been on the data used to train predictive algorithms”
  + Datasets are not comprehensive and consist of overrepresentations of certain racial/socioeconomic groups
  + Training algorithms on these datasets exacerbates the inherent bias within policing and criminal justice systems, and the data gets fed back into the training set, further exacerbating racist biases
* “Data that are limited, incomplete, inaccurate, or biased due to discriminatory policing practices stand to reinforce disparate treatments for already marginalized communities”
* “Computer scientists, technology vendors, and policymakers insist that predictive systems not only improve efficiency in the criminal justice system, but will ultimately make the legal system fairer”
* Types of algorithms
  + Predictive policing - identifying times and locations where crime is more likely to occur
  + Bail Algorithms/Recidivism Algorithms - give a likelihood that someone is likely to commit a crime or reoffend
    - COMPAS Recidivism Algorithm - used by judges, probation and parole officers
      * Score correctly predicted an offenders recidivism 61 percent of the time, but was only correct in its predictions of violent recidivism 20 percent of the time
      * Black defendant were often predicted to be at a higher rick of recidivism than they actually were, they were 45% likely to be misclassified
  + Facial Recognition Algorithms - used in identifying people at the scene of a crime, built of databases that consist of an overrepresentation of certain races

[The Mathematics of Policing](https://www-personal.umd.umich.edu/~tiananw/PredPol.pdf)

People Based Policing

* Individuals are studied rather than geography
* Form a co-offence network - individuals who share an offence are used to form a network, by which predictions and recommendation are made
  + Ex. Chicago Police Department’s Strategic Subjects List (“heat list”)
* Crime dataset is modeled based on a collection of police records that document crime events in a geographic area of interest over a period of time
  + Hypergraph with three disjoint sets, actors A, incidents I, and resources R
  + Hyperedge associates a set of actors and a set of resources with a single incident - can obtain 3 bipartite graphs, modeling the relations between actors
* Criminal profiling
  + Given partial set of crime suspects and a known co-offending network, recommends the top N potential suspects of crime
  + A set of random walks are performed for a single offender, *u*, to computer the top n suspects recommended to be co-offending with u

Contagion models

* View police and gun violence as health epidemics instead of using war metaphors
* Impact of violence interruption on the diffusion of violence
* Repurposing recidivism models
  + Proposed to repurpose it to model police use of force - co-complaint networks
* Many criticisms of the algorithms also come from the use of the algorithms themselves
  + Many police precincts or criminal justice programs will weigh the results of these algorithms quite heavily, sometimes ignoring other information related to the case
  + Antidotes: making arrests with not enough evidence,

[Predicting Policing, A Mathematical Primer](https://www.ams.org/journals/notices/202407/rnoti-p929.pdf)

* RAND Corporation defines predictive policing as “the application of analytical techniques- particularly quantitative techniques- to identify likely targets for police intervention and prevent crime or solve past crimes by making statistical predictions”
* Summary of Basic PredPol Model
  + Epidemic type aftershock (ETAS) model
    - Popular for earthquake occurrence
  + Reaction Diffusion Model
    - Modeled using partial differential equations
    - Typically used to describe chemical reactions where activators and inhibitors move, mix, and interact
  + Discrete model
    - Houses are placed on a lattice in the place with constant spacing *L*
    - With the plane s = (x, y), the score in question As (t) is interpreted as either the attractiveness of a house to a burglar, or risk of victimization
    - As(t) = As0 + Bs(t)
      * As0 is a fixed value
      * Bs(t) dynamic value that models the idea that if a site has been attacked, it has a higher risk of being revictimized shortly after the first incident

[Legitimizing algorithms in the criminal justice system](https://heinonline.org/HOL/Page?handle=hein.journals/osjcl15&id=585&collection=journals&index=)

Arguments for big data algorithms

* More effective allocation of police resources
* To notify police of potentially dangerous individuals at specific locations
* To guide efforts to intervene with individuals before they engage in criminal activity
* To advice judges on pre trial detention
* Provide guidance to judges at sentencing

[The accuracy, fairness, and limitsof predicting recidivism](https://www.science.org/doi/epdf/10.1126/sciadv.aao5580)

* Algorithms predict where crimes will most likely occur, who is most likely to commit a violent crime, who is likely to fail to appear at court hearing, and who is likely to reoffend at some point in the future
* COMPAS - correctional offender management profiling for alternative sanctions
  + Predicts defendant’s risk of committing a misdemeanor or felony within 2 years of assessment from 137 features about an individual and the individual’s past criminal record
  + Study shows that overall accuracy for white defendants if 67%, balck defendant was 63.8%
  + Black defendants who did not recidivate were incorrectly predicted to reoffend at rate of 44/9%, while white defendants were incorrectly predicted at 23.5%
  + Underpredicting recidivism for white and overpredicting recidivism for black defendants
  + Some argued that the likelihood of recidivism among high-risk offenders if the same regardless of race
* Compas typically used at pretrial detention, trial, sentencing, and prole

[The Predictive Validity of the LSI-R on a sample of Offenders - Iowa](https://www.uscourts.gov/sites/default/files/71_3_4_0.pdf)

* Level of Service Inventory-Revised
* Parole evaluations

<https://journals.sagepub.com/doi/abs/10.1177/0011128705281756>

<https://www.elgaronline.com/edcollchap/edcoll/9781788972819/9781788972819.00007.xml>

[Algorithms in Policing: An Investigative Packet](https://law.yale.edu/sites/default/files/area/center/mfia/document/infopack.pdf)

* Three common types of policing algorithms used by agencies include predictive policing algorithms, facial recognition algorithms, and pattern recognition programs.
* Atlanta, Austin, Detroit, Los Angeles, Philadelphia, Portland, and San Francisco, chicago, new york

**LOS ANGELES PROFILE**

Summary

* CA eliminated cash bail, implemented predictive recidivism algorithms in 2018
* Ended use of popular predictive policing algorithms, developed squads that run their own algorithms - ended predpol in 2021
* The Los Angeles Police Department (LAPD) also faced criticism for its person-based predictive policing program, Operation LASER, which was ultimately ended in April 2020.

Policing

[Predictive policing substantially reduces crime in Los Angeles during months-long test](https://newsroom.ucla.edu/releases/predictive-policing-substantially-reduces-crime-in-los-angeles-during-months-long-test)

* Model developed over six years uses police crime data, predicted and prevented twice as much crime as human analysts during a 21 month period
* The algorithm predicts crime times and locations by learning from historical data, similar to how streaming services predict user preferences.
* In Los Angeles, the model correctly predicted crime locations 4.7% of the time, compared to 2.1% for human analysts, despite targeting very small areas
* Police officers were deployed to predicted crime hotspots in three LAPD divisions, resulting in a 7.4% reduction in crime, or 4.3 fewer crimes per week.
* The study estimated that using the algorithm could save Los Angeles $9 million annually by reducing crime-related costs.

[How the LAPD Uses Data to Predict Crime](https://www.wired.com/story/los-angeles-police-department-predictive-policing/)

* The Los Angeles Police Department (LAPD) is using data to predict crime through various initiatives, including Operation LASER, which began in 2011 and uses technology developed by Palantir to analyze past crime and arrest data.
* Operation LASER scores individuals based on their past offenses, with points assigned for factors such as gang affiliation, parole or probation status, and police interactions, and those with higher scores are placed on the Chronic Offender Bulletin for closer monitoring.
* In addition to LASER, the LAPD is using PredPol software to predict property crimes by analyzing crime types, times, and locations, and generating maps with 500-by-500 foot hotspots for officers to patrol.

[This article is more than 2 years old LAPD ended predictive policing programs amid public outcry. A new effort shares many of their flaws](https://www.theguardian.com/us-news/2021/nov/07/lapd-predictive-policing-surveillance-reform)

* Ended contract with pred pol 2021
* However, newly released public documents reveal that these programs validated existing patterns of policing and reinforced decisions to over-police Black and brown communities, leading to their over-policing and displacement.
* The documents, which include internal LAPD documents and emails, were released as part of a report by the Stop LAPD Spying coalition and suggest that pledges to reform the programs amid public criticism were largely ineffective.
* The LAPD inspector general, Mark Smith, found in 2019 that the criteria used to identify people likely to commit violent crimes were inconsistent, and experts argue that the new program is likely to repeat the same mistakes.
* A new effort, Data-Informed Community-Focused Policing (DICFP), was introduced by the LAPD, aiming to establish a deeper relationship between community members and police, address public concerns, and prevent crime.
* The program uses a problem-solving model called Sara, which involves increased patrolling and surveillance to prevent future crimes, raising concerns that it may perpetuate the same flaws as the previous predictive policing programs.

Incarceration

[This article is more than 6 years old Imprisoned by algorithms: the dark side of California ending cash bail](https://www.theguardian.com/us-news/2018/sep/07/imprisoned-by-algorithms-the-dark-side-of-california-ending-cash-bail)

* 2018 - california eliminated cash bail system, replacing it with "risk assessment" tools that use algorithms to determine whether a person should be released from jail before trial.
* Critics argue that the algorithm-based system gives local authorities too much discretion to decide what constitutes "high risk" and makes it easy for prosecutors and judges to keep people in jail, potentially leading to a rise in pre-trial detention.
* The law allows for "preventive detention," which enables courts to determine that someone is a "public safety" threat and should be jailed, shifting the burden from the state to prove that someone is a risk to the individual to prove that they are entitled to freedom.
* The algorithm used to create an individual "risk score" is based on data from the criminal justice system, which has documented racial biases in police stops, searches, and arrests, raising concerns that the new system will perpetuate these biases.
* People with arrest records from over-policed communities of color could be deemed "high risk" and jailed as a result, with no evidence suggesting that these algorithms have produced positive changes when implemented.
* Critics argue that the new system should focus on rehabilitation and services, with "needs assessments" instead of risk assessments, and provide meaningful due process for individuals facing detention.

**CHICAGO PROFILE**

Summary

* Chicago eliminated Heat list program in 2019, they still utilize place based predictive policing algorithms

Policing

[Heat Listed](https://www.theverge.com/c/22444020/chicago-pd-predictive-policing-heat-list)

* The algorithm, which analyzed McDaniel's proximity to and relationships with known shooters and shooting casualties, indicated that he was more likely than 99.9% of Chicago's population to either be shot or have a shooting connected to him, but it couldn't determine whether he would be the shooter or the victim.
* McDaniel, who had no violent offenses on his record at the time, was offered assistance in finding a job or mental health services, but was also warned that the Chicago Police Department would be watching him, effectively putting him under surveillance.
* The Chicago Police Department's predictive policing program uses a "heat map" to track gun crimes, with areas of high concentration shaded in red, and Austin, where McDaniel lives, is one of the hottest areas, accounting for almost 10% of the city's murder rate in 2020.
* In 2003, the Chicago Police Department (CPD) implemented its first CompStat program, which focused on crime hotspots, and saw a decrease in homicides the following year.

[Algorithm predicts crime a week in advance, but reveals bias in police response](https://biologicalsciences.uchicago.edu/news/algorithm-predicts-crime-police-bias)

* Researchers from the University of Chicago have developed a new algorithm that can predict crime one week in advance with about 90% accuracy by analyzing patterns in time and geographic locations from public data on violent and property crimes.
* The model was tested and validated using historical data from the City of Chicago and performed equally well with data from seven other U.S. cities: Atlanta, Austin, Detroit, Los Angeles, Philadelphia, Portland, and San Francisco.

Incarceration

**NEW YORK PROFILE**

Summary

Policing

[NYPD”s Machine-Learning Software Spots Crime Patterns](https://dsiac.org/articles/nypds-machine-learning-software-spots-crime-patterns/)

* 2024 - The New York City Police Department (NYPD) has developed a machine-learning software called Patternizr to recognize patterns in large databases of activity reports, which can be useful for counter-terrorism and military activities.
* The NYPD has been using Patternizr since December 2016, making it the first law enforcement agency to use this type of tool, as reported in the INFORMS Journal on Applied Analytics.

Incarceration

[In the newsAlgorithm Helps New York Decide Who Goes Free Before Trial](https://criminaljustice.cityofnewyork.us/in-the-news/algorithm-helps-new-york-decide-who-goes-free-before-trial/)

* New York City has implemented an algorithm to help judges decide who should be released before trial and who should be held in jail, with the goal of making more informed decisions about bail.
* The algorithm, also known as a "release assessment," was developed over a five-year period at a cost of $2.7 million and is designed to reduce bias in the decision-making process.
* The city's effort to develop the algorithm was motivated by a desire to address criticisms of other models that recommended lockup for disproportionate numbers of young Black and Latino men, and to reduce the city's jail population.
* The panel debated how to balance accuracy and fairness, with Mitchell noting that an accurate algorithm would predict whether defendants show up to court, while a fair algorithm would not result in more release recommendations for white defendants than others.
* The algorithm's accuracy was also demonstrated by the fact that defendants with higher scores returned to court more often than those with lower scores.

**HOUSTON PROFILE**

Summary

Policing

* The Houston Police Department (HPD) has approved a $177,483 contract with AI technology firm Airship AI to install 64 new cameras throughout the city, aiming to improve public safety amidst staffing shortages.

Incarceration

[Judge says Houston-area bail system unfair to poor offenders](https://www.seattletimes.com/nation-world/judge-says-houston-are-bail-system-unfair-to-poor-offenders/)

**PHILADELPHIA PROFILE**

Summary

Policing

Incarceration

[Pennsylvania officials need to track the use of algorithms, which already make important decisions about schools, funding, and criminal justice | Opinion](https://billypenn.com/2022/08/03/pennsylvania-algorithms-regulation-ai-task-force/)

Help

<https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-Present/ijzp-q8t2/data>

[IUCR classifications](https://data.cityofchicago.org/widgets/c7ck-438e)

[Prison exits](https://idoc.illinois.gov/reportsandstatistics/prison-exit-data-sets.html)

[Prison Admission](https://idoc.illinois.gov/reportsandstatistics/prison-admission-data-sets.html)

[Predictions put into practice: a quasi-experimental evaluation of Chicago’s predictive policing pilot](https://link.springer.com/article/10.1007/s11292-016-9272-0) - 11/19/2024

* “The individuals at high risk of being involved in crime in the future were identified using a predictive policing strategy based on a statistical model of co-arrest networks in a policing context. Importantly, the high-risk individuals were not necessarily under official criminal justice supervision nor were they identified through intelligence to be particularly criminally active”
* First phase of CPF’s larger predictive policing program - individuals at highest risk for gun violence were placed on a strategic subjects list
  + “SSL disseminated by central command and the prevention strategy was deferred to district commanders who decided the relevant policing intervention strategy for SSL individuals in their district”

Overview of the SSL PP program

* Developed in collaboration between the Chicago Police Department and the Illinois Institute of Technology, funded by the National Institute of Justice
* Prediction model uses social networks (co-arrests) to previous homicide victims to predict the likelihood of someone becoming a victim of a homicide
  + First degree link - subject and individual with whom the subject was previously co arrested, who later became a homicide victim
  + Second degree link - subject was co arrested with another person, who in turn was arrested with a later homicide victim
  + Fitted using a quadratic model, meaning the probability of being a homicide victim increased at an increasing rate with respect to the count of links
* Based on literature that examines correlations between victimization and the social connections to others who were victims of homicide
* Individuals on SSL were considered to be “persons of interest” to the CPD
* They collected qualitative evidence to identify the prevention and intervention strategies used in the field, since prevention strategy was left up to individual district commanders to determine
  + 68.8% of presentations had no mention of SSL
  + 18.7% of presentations had discussion and executive guidance
  + Two common themes for how commanders recommended addressing SSL subjects

1. Officers assigned to make contact with SSL subjects on varying schedules (going to home addresses or other locations)
2. Officers provided info about the identities of SSL, and to make contact if noticed

* Generally, observations of COMPSTAT meeting and interviews suggested topic of SSL subjects received relatively little attention
* CPD originally stated that they would only treat the top 20 individuals in each district, and everyone who scored above a certain threshold (500+)
  + Leading to a substantial overlap in risk scored between the SSL and a group of individuals that did not end up on the list because 1) some district did not have a large number of the highest-risk people in their area of operation, so individuals with slightly lower scores appeared on their list 2) the DOC had some discretion on who to put on the list, especially when there were a lot of very high risk individuals, so not all of the highest scoring individuals were ultimately placed on the SSL

Analysis

* Goals:
  + Testing whether introduction of SSL affected city level homicide rates
  + Using individual level data - apply propensity score matching methods to estimate the impact of the SSL on the likelihood of high-risk individuals being involved in gun violence
  + Test hypotheses for why program may or may not have worked
* Method - Uses an intent-to treat analysis to estimate impact of SSL version 1 on homicide levels and individual involvement with gun crime using quasi-experimental methods
  + Interrupted time series analysis of city level data to determine whether the introduction of SSL changed aggregate homicide crime trend
    - Used model of homicides as a time series
    - Used an impact assessment of the introduction of the SSL version
    - Identify the model for the time series, characterizing autoregressive, non-seasonal differences, and lagged forecast errors
    - Then model in intervention effects
  + Conduct propensity score analysis using individual level data in order to determine whether being on the SSL affected the likelihood of being involved with gun violence
* Hypothesized that the program was designed to enhance the deterrence message and incapacitation effect (removes SSLs from the community at a higher rate)

Results

* Homicide trends display a high degree of seasonality, more homicides occur in the warm months

[Office of Inspector General - ADVISORY CONCERNING THE CHICAGO POLICE DEPARTMENT’S PREDICTIVE RISK MODELS](https://igchicago.org/wp-content/uploads/2020/01/OIG-Advisory-Concerning-CPDs-Predictive-Risk-Models-.pdf) - 11/20/24

* Charlie Beck - Interim Superintendent
* Office of Inspector General (OIG) conducted a review of CPD’s risk models known as Strategic Subject List (SSL) and Crime and Victimization Risk Model (CVRM)
* Had received $3.8 million in federal grants to develop these mode,s, designed to predict the likelihood an individual would become a “party to violence” (PTV), aka victim or offender in a shooting
* SSL produced risk scores while CVRM produced risk tiers
* First five party to violence risk models were iterations of SSL, while sixth and most recent version is CVRM
* Team at Illinois Institute of Technology (IIT) created six versions of risk models and calculated scores and tiers using deidentified data from CPD’s information services division (ISD)
* CPD contracted RAND corporation to evaluate Versions 1, 5, 6 of the model
* Every individual arrested at least once within a four-year time period prior to IIT’s calculation received a risk score or risk tier
* Individuals who were victims of crimes but never arrested did not receive a risk score or tier

How did they use PTV risk models?

* Custom Notification Program: PTV models help inform referrals in its notification program, designed to identify at-risk individuals and connect them to social support services
* Target Repeat-Offender Apprehension and Prosecution (TRAP) program - allows department and state attorney office to work together to identify repeat offenders with the high propensity toward violent gang related crime.
  + Program “focuses on enhanced prosecution to detain, convict, and incarcerate these offenders”
* Gang violence reduction Strategy (GVRS) - information gathering, analysis, dissemination of intelligence, linking of gangs to their factions, social network mapping, and a variety of mission-specific operations focused on target gang members and their associations

General Areas of Concern

* Risk score and tiers were unreliable
* CPD did not properly train sworn personnel to use PTV risk models
* CPD lacked controls for internal and external access to and use of PTV risk scores and tiers
* Interventions influenced by CPD’s PTV risk models may have attached

[CPD's 'Heat List' and the Dilemma of Predictive Policing](https://www.rand.org/pubs/commentary/2016/09/cpds-heat-list-and-the-dilemma-of-predictive-policing.html) - 11/21/2024

* “The cpd reports changing the way it uses its list substantially since we reviewed it in 2014. The main change is the use of an intervention called ‘custom notification’ with some members of the list. These are visits during which the list member and/or their families are told they are at risk of being a party to violence and why. They are informed of social services they can use if they wish to make a life change and warned that they will be target for increased prosecution if they engage in criminal activity.”
* First version of SSL was evaluated by RAND from late 2013 to 2014 - throughout this time period, there was little guidance from CPD on what specifically to do with people on the list besides a general “take action”

[Predictive Policing The Role of Crime Forecasting in Law Enforcement Operations](https://www.rand.org/pubs/research_reports/RR233.html) - 11/21/2024

<https://www.theverge.com/2014/2/19/5419854/the-minority-report-this-computer-predicts-crime-but-is-it-racist>

* As Commander Jonathan Lewin, who’s in charge of information technology for the CPD, told *The Verge*: “This [program] will become a national best practice. This will inform police departments around the country and around the world on how best to utilize predictive policing to solve problems. This is about saving lives.”
* 2009, National Institute of justice offered millions of dollars in grants available for police departments with “burgeoning predictive programs”
* Chicago received more than $2 million to test two phases of its experimental program - they
  + In actually they only got $200,000
* Miles Wernick, one of the engineers that worked on the SSL “says that those algorithms re quickly able to arrow down the list of people who ‘clearly have a high likelihood of being involved in violence’ “
  + “It’s not just shooting somebody or being shot,” “it has to do with the person’s relationships to other violent people”
* Goal was to have representatives from police department visit high-risk people before those individuals have committed a crime
* Attempts to obtain the heat list are “ [denied](http://cdn2.sbnation.com/assets/4020793/Stroud-CPD-FOIA.jpg) because sharing that information could "endanger the life or physical safety of law enforcement personnel or any other person," according to a letter from the CPD’s Office of Legal Affairs.”

<https://nnscommunities.org/wp-content/uploads/2014/04/NAVCAP_Guide_final_web.pdf> - 2/27/2024