Safety and Justice

A RAND INFRASTRUCTURE, SAFETY, AND ENVIRONMENT PROGRAM

Analysis in Support of Public Safety

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Director

This Presentation Will…

- **Contrast *tactical* uses of data with *strategic* uses**
- **Point out opportunities to improve management processes in addition to crime analysis**
- **Present a variety of examples from RAND research conducted in U.S. cities**

Outline

- Information technology alone is not enough
- Balance tactical versus strategic uses of criminal justice data
- Data is essential to make sure practices evolve
- Analysis can improve management processes
- Predictive policing is promising

Outline

- **Information technology alone is not enough**
  - **IT and crime trends in the United States**
- **Balance tactical versus strategic uses of criminal justice data**
- **Data is essential to make sure practices evolve**
- **Analysis can improve management processes**
- **Predictive policing is promising**

Information Technology Alone Is Not Enough

- LEMAS is a national survey of US law enforcement agencies
- In 1987 80% of police agencies had *no computers*. Among large agencies, 40% had no computers
- In 2003, 90% of departments reported IT usage
- However, agencies that increased IT did not see improvements in solving cases, reducing crime, increasing convictions, or protecting officers
- Major IT efforts, such as the FBI's Trilogy project, have been million dollar disasters

IT Combined with Modern Management Practices Increases Productivity

- For departments that
  - Invested in IT for crime data collection and analysis
  - Used a problem-solving paradigm
  - Developed feedback for setting priorities
  - Deployed in a geographic-based structure
- 3% increase in cases solved
- 1% decrease in crime

Outline

- Information technology alone is not enough
- **Balance tactical versus strategic uses of criminal justice data**
  - **Tracking illegal guns in Los Angeles**
- Data is essential to make sure practices evolve
- Analysis can improve management processes
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Ammunition Laws in Los Angeles Offered a Unique Strategy to Identify Illegal Guns

- Since 1998 ammunition purchasers show ID and leave a thumbprint
- Based on two months of ammunition transactions we found
  - 2.6% of transactions involved prohibited buyers
  - 5,000 rounds per month were illegally purchased
- LAPD began a program of generating leads based on the logs

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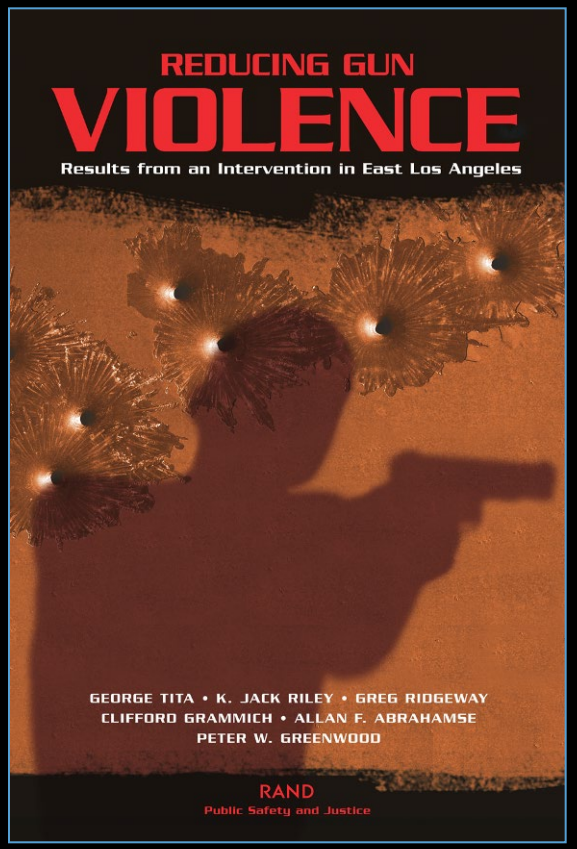
- LAPD began a program of generating leads based on the logs
- In October 2009 Gov. Schwarzenegger signed a bill making ammunition logs statewide

Outline

- Information technology alone is not enough
- Balance tactical versus strategic uses of criminal justice data
- **Data is essential to make sure practices evolve**
  - **Reducing gun violence in East Los Angeles**
  - **Gauging community relations in Cincinnati**
- Analysis can improve management processes
- Predictive policing is promising

Analysis of Gangs and Guns Result in New Strategies

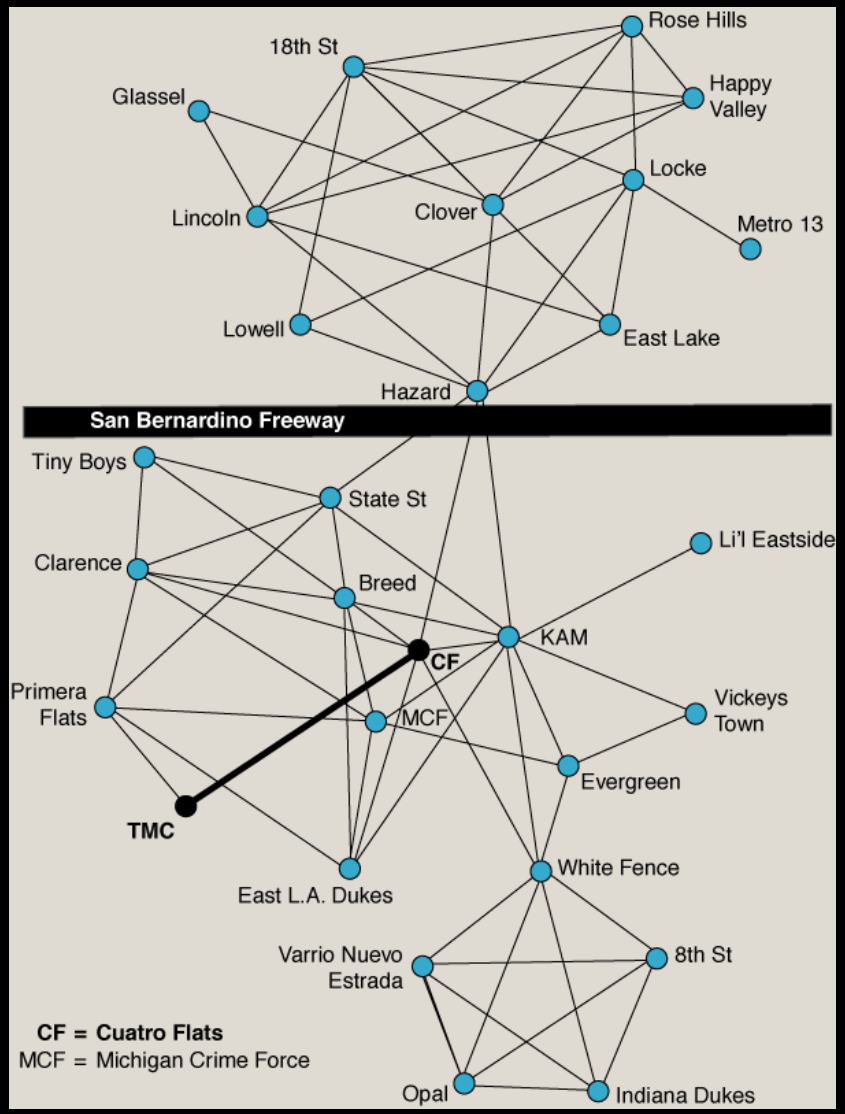
- Replicated the "Boston Gun Project" in East Los Angeles
  - Data countered conventional wisdom
- Developed strategies for intervening in the illegal firearm market in Los Angeles
  - Identified underutilized information



Not All Gang Problems Are Equal

- All knew that gangs were central to violence in East Los Angeles
  - We mapped out which were most problematic
- The rivalry between The Mob Crew and Cuatro Flats was growing particularly violent
- Violence was typically *premeditated* attacks against rival gangs in rivals' territory

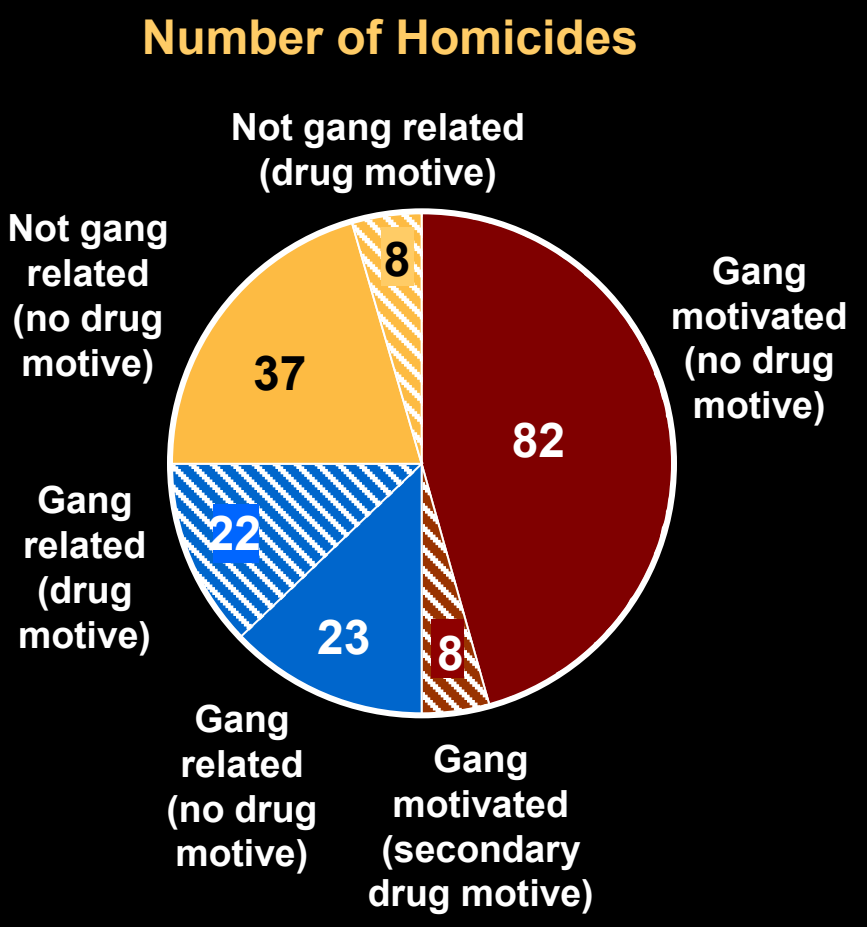
Network Map of Hollenbeck Gang Rivalries



RAND

Drugs Were Not the Primary Cause of Violence

- Analysis of homicides indicated that "respect" was driving the violence
- Few drug-involved homicides concerned drug territory disputes
- Required substantial effort to convince local police



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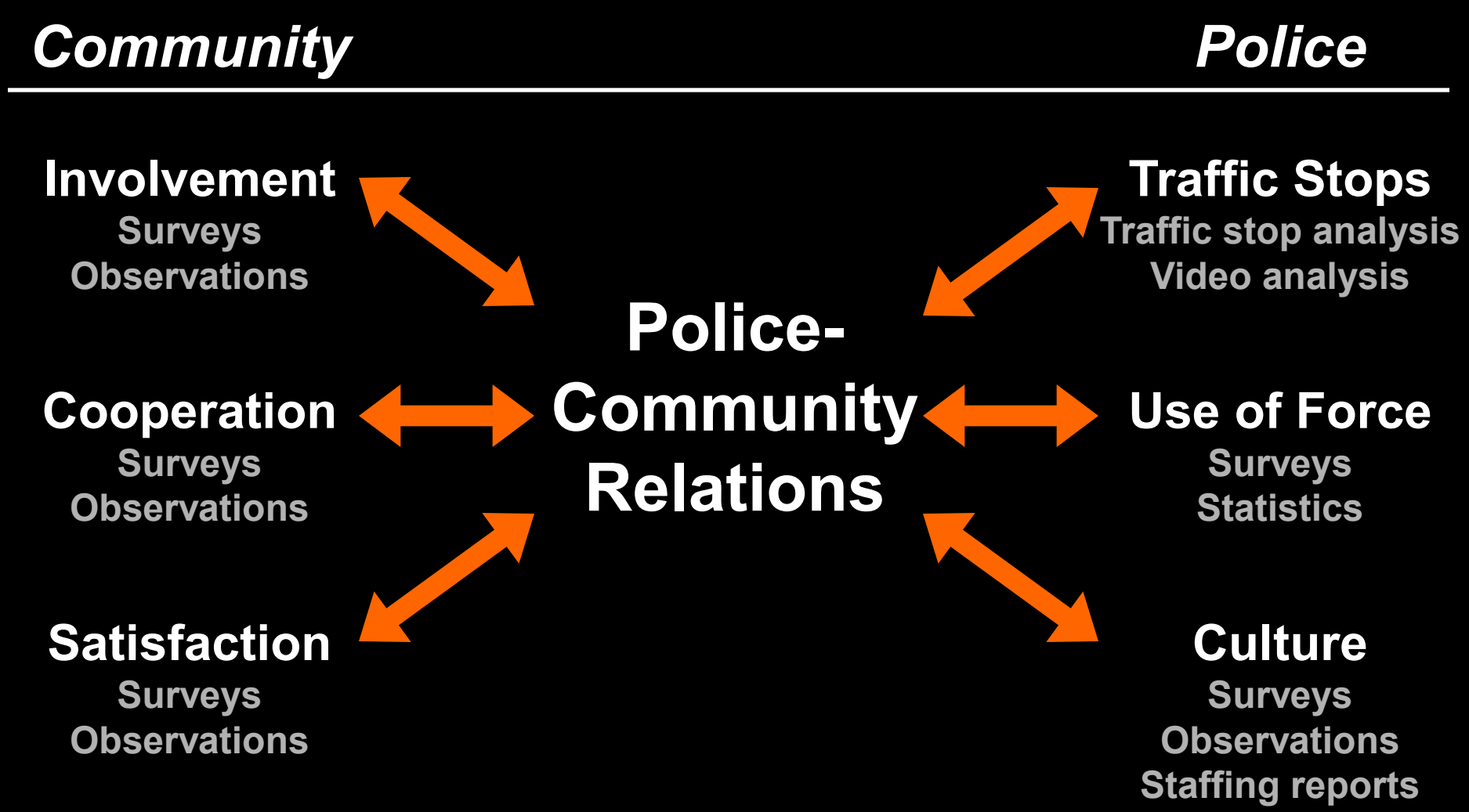
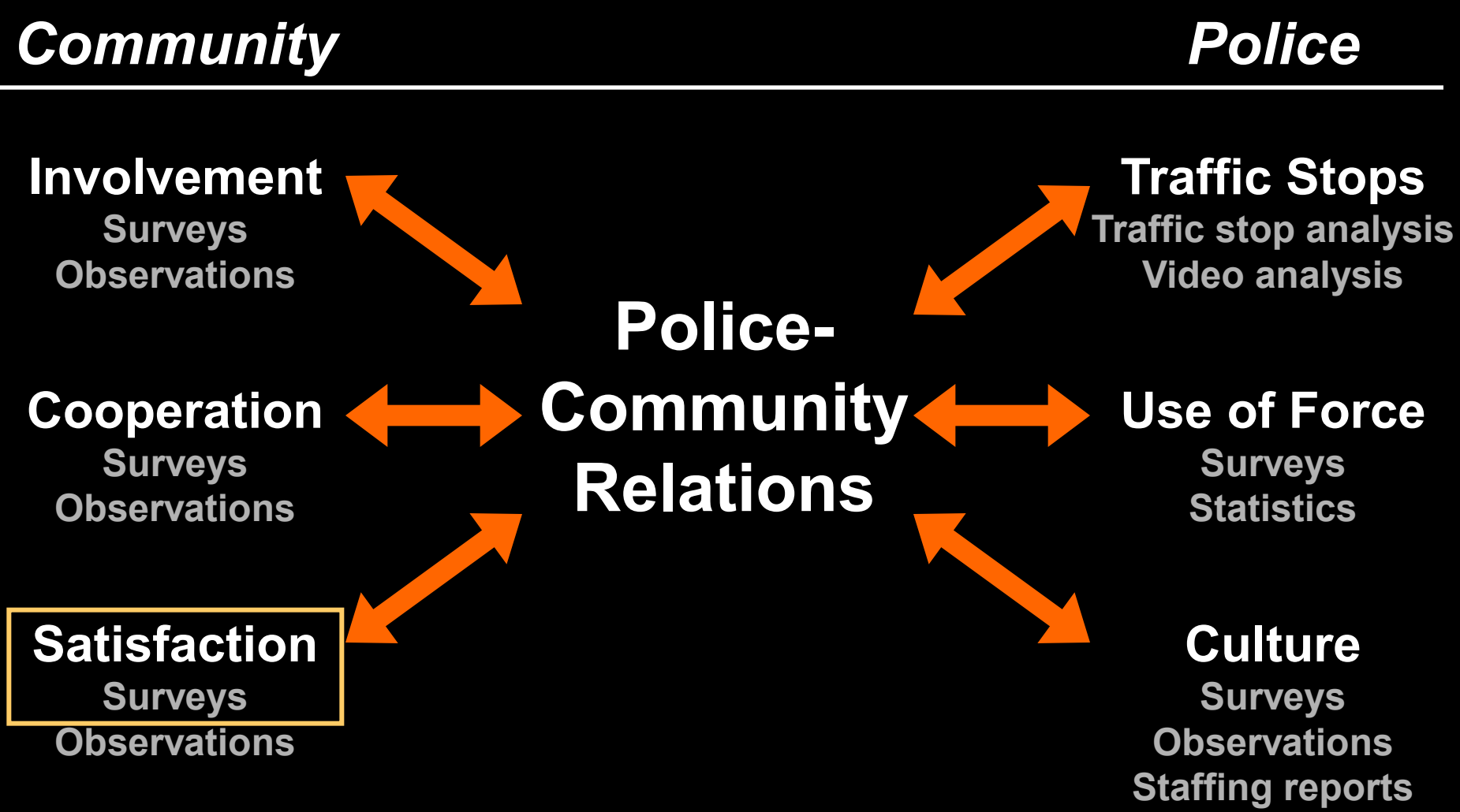
Aspects to Police-Community Relations

Community ***Police***

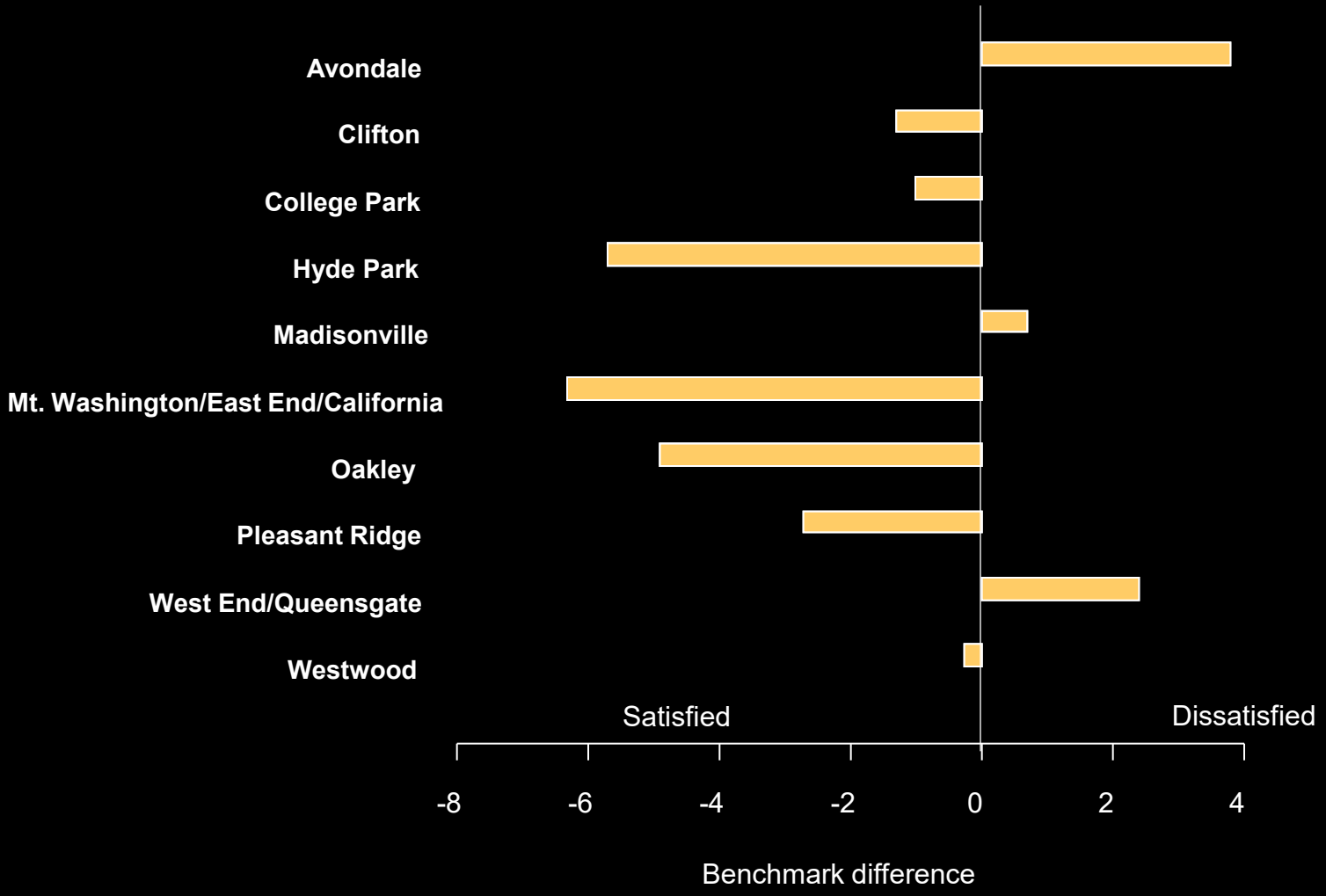
Aspects to Police-Community Relations



Aspects to Police-Community Relations



Two Neighborhoods Appear to Have Low Police Satisfaction



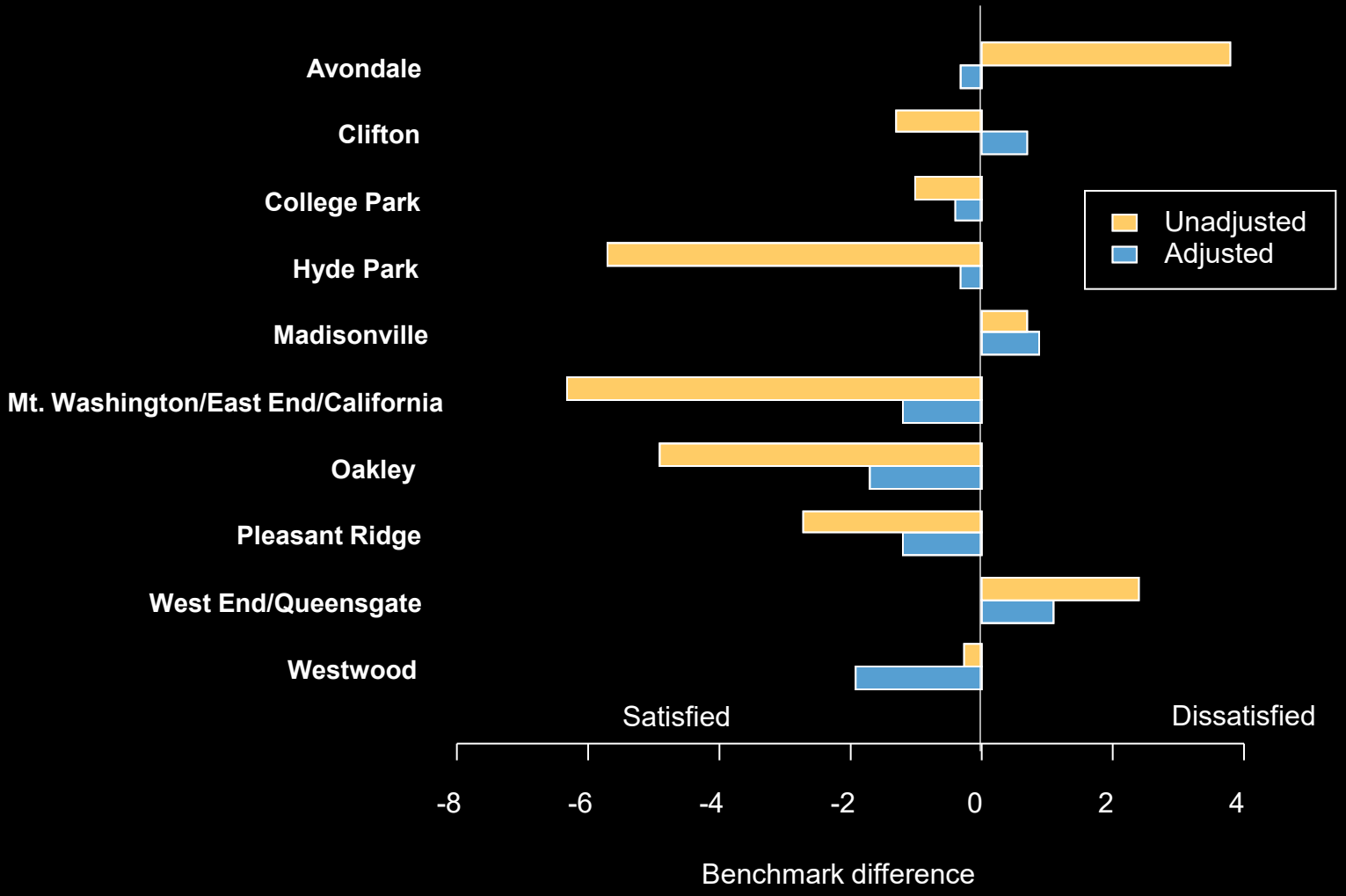
Neighborhoods Are Not Directly Comparable

	Target Neighborhood (N=56)	All Other Neighborhoods (N=2,111)
Black	80%	43%
Employed	65%	69%
Education (level)	2.5	3.1
Income (level)	1.6	2.9
Disorder in neigh.	15.6	10.0
Neighborhood crime	2.2	1.6
Fear of crime	2.8	2.4
Neighborhood participation	0.3	0.2
Neigh. socialization	2.6	2.4
Trust of neighbors	1.9	2.7
Know police	47%	33%
Married	9%	35%
Home ownership	13%	53%
Number of children	1.0	0.7
Male	44%	38%
Age (years)	40.6	46.5

…But We Can Construct a Suitable Comparison

	Target Neighborhood (N=56)	All Other Neighborhoods (N=2,111)	Comparable Respondents (N=247)
Black	80%	43%	79%
Employed	65%	69%	63%
Education (level)	2.5	3.1	2.5
Income (level)	1.6	2.9	1.7
Disorder in neigh.	15.6	10.0	15.5
Neighborhood crime	2.2	1.6	2.2
Fear of crime	2.8	2.4	2.7
Neighborhood participation	0.3	0.2	0.3
Neigh. socialization	2.6	2.4	2.6
Trust of neighbors	1.9	2.7	1.9
Know police	47%	33%	47%
Married	9%	35%	9%
Home ownership	13%	53%	13%
Number of children	1.0	0.7	1.0
Male	44%	38%	45%
Age (years)	40.6	46.5	40.5

Much Of The Dissatisfaction Is Not Due To The Neighborhood



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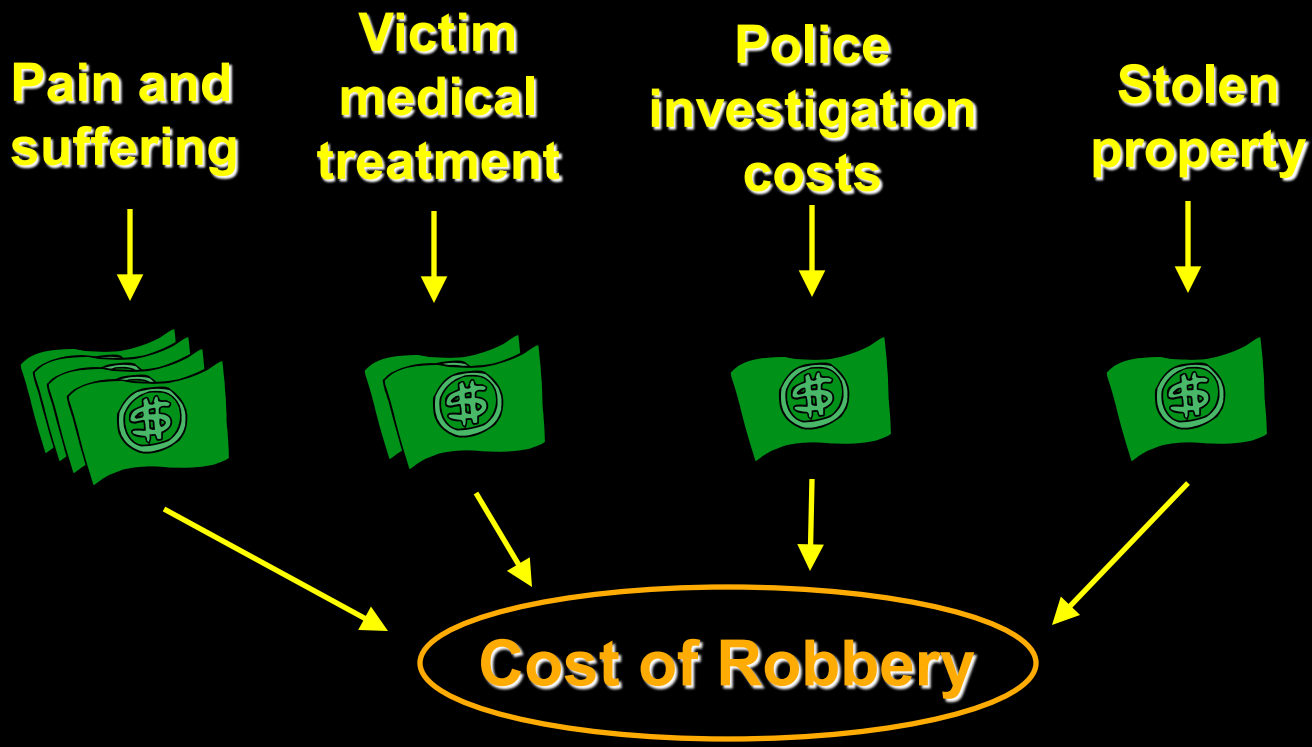
- Information technology alone is not enough
- Balance tactical versus strategic uses of criminal justice data
- Data is essential to make sure practices evolve
- **Analysis can improve management processes**
  - **Assess return on investment in hiring**
  - **Assess officer performance at New York City PD**
- Predictive policing is promising

Three Steps to Assess Return on Police Hiring

- What are the costs of crime, and how do we estimate them?
- How much does changing the size of the police force impact crime?
- How can we use the above information to conduct cost-benefit analyses of police personnel investments?

Accounting-Based Methods

– Assign a dollar value to each individual cost component



– May understate societal costs

Contingent Valuation

- Survey people regarding willingness to pay for crime control initiatives

- Can better capture both tangible and intangible costs, but respondents may misreport true willingness to pay

Hedonic Valuation

– Use housing price differences to measure value of neighborhood amenities

$200,000

$175,000

– Challenge: Often difficult to separate effects of crime from other neighborhood characteristics

Existing Studies Estimate the Cost of a Representative Crime

	Accounting-Based Methods		Contingent Valuation Method	
Crime Type	**Study 1**	**Study 2**	**Study 3**	**Average**
Homicide	$5,000,000	$9,300,000	$12,000,000	$8,600,000
Rape	$150,000	$220,000	$280,000	$220,000
Robbery	$23,000	$51,000	$130,000	$67,000
Serious Assault	$55,000	$120,000	$84,000	$87,000
Burglary	$5,000	$4,400	$30,000	$13,000
Larceny	$2,800	$1,500	N/A	$2,100
Vehicle Theft	$9,000	$9,200	N/A	$9,100

Quasi-Experimental Studies Aim to Isolate the Effects of Additional Police From Other Factors

- To overcome the confounding problem, researchers look for "random" variation in police force size

- Examples:
  - Focus on a large-scale federal hiring program that increased officers
  - Measure how crime changes when patrol officers are reallocated due to terrorist threats

Higher-quality studies consistently show that police reduce crime.

We Can Estimate Crime Reduction from a 1% Increase in Police Personnel Levels

	Election Cycle	Hiring	Timing	Reallocation		
Index Crime Type	Study 1	Study 2	Study 3	Study 4	Study 5	Combined Impact
Homicide	–0.91	–0.84	–1.39			–0.93

We Can Estimate Crime Reduction from a 1% Increase in Police Personnel Levels

	Election Cycle	Hiring	Timing	Reallocation		
Index Crime Type	**Study 1**	**Study 2**	**Study 3**	**Study 4**	**Study 5**	**Combined Impact**
Homicide	**–0.91**	**–0.84**	–1.39			**–0.93**
Rape	–0.03	–0.42				–0.17
Robbery	**–0.45**	**–1.34**	**–0.53**			**–0.59**
Serious Assault	0.40	**–0.96**	–0.29			**–0.29**
Burglary	–0.20	**–0.59**	**–0.42**	–0.30		**–0.40**
Larceny	–0.14	–0.08				–0.10
Vehicle Theft	**–1.70**	**–1.85**	–0.45	**–0.86**	**–0.33**	**–0.44**

How Do We Calculate the Impact of a 10% Increase in Police In L.A.?

Index Crime Type	Average Number of Crimes, 2005–07	Projected Crimes Averted from 10% Increase in Police	Cost Per Crime ($)	Projected Cost Savings ($ millions)
Homicide	453			

– Average number of homicides per year in L.A. = 453 homicides

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Index Crime Type	Average Number of Crimes, 2005–07	Projected Crimes Averted from 10% Increase in Police	Cost Per Crime ($)	Projected Cost Savings ($ millions)
Homicide	453	42		

- Average number of homicides per year in L.A. = 453 homicides
- 453 homicides X .00927 (effect of police on homicides) x 10% (increase in number officers) = 42 fewer homicides

How Do We Calculate the Impact of a 10% Increase in Police In L.A.?

Index Crime Type	Average Number of Crimes, 2005–07	Projected Crimes Averted from 10% Increase in Police	Cost Per Crime ($)	Projected Cost Savings ($ millions)
Homicide	453	42	8,600,000	363.0

- Average number of homicides per year in L.A. = 453 homicides
- 453 homicides X .00927 (effect of police on homicides) x 10% (increase in number officers) = 42 fewer homicides
- 42 less homicides X $8,646,216 (cost/homicide) = $363.27 million dollars

10% Increase in Police In L.A. Yields Substantial Projected Cost Savings

Index Crime Type	Average Number of Crimes, 2005–07	Projected Crimes Averted from 10% Increase in Police	Cost Per Crime ($)	Projected Cost Savings ($ millions)
Homicide	453	42	8,600,000	363.0
Rape	951	0	220,000	0.0
Robbery	13,743	814	67,000	54.8
Serious Assault	14,169	414	87,000	36.1
Burglary	20,462	827	13,000	10.8
Larceny	59,704	0	2,100	0.0
Vehicle Theft	24,872	1,094	9,100	9.9
Aggregate Cost Savings ($ millions)				475.0

Approach Also Allows Us to Estimate Benefits of Additional Police Officers

Police Department	Expected Crime Reduction Benefits of Hiring One Additional Officer
Chicago Police Department	$390,000
Dallas Police Department	$670,000
Houston Police Department	$800,000
Los Angeles Police Department	$480,000
L.A. County Sheriff's Department	$150,000
Miami-Dade Police Department	$300,000
Philadelphia Police Department	$650,000

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Evaluation and Risk Management Can Also Be a Product of Data and Analysis

Stop Characteristic	Example Officer (%) *n* = 392
Percent black	86%

NYPD Has Substantial Information on the Stop Features

Stop Characteristic		Example Officer (%) *n* = 392
Percent black		**86%**
Month	January	3
	February	4
	March	8
Day of the week	Monday	13
	Tuesday	11
	Wednesday	14
Time of day	(4-6 p.m.]	9
	(6-8 p.m.]	8
	(8-10 p.m.]	23
	(10 p.m. -12 a.m.]	17
Patrol borough	Brooklyn North	100
Precinct	B	98
	C	1
Outside		96
In uniform	Yes	99
Radio run	Yes	1

Benchmark with Similar Stops Other Officers Made

Stop Characteristic		Example Officer (%) *n* = 392	Internal Benchmark (%) ESS = 3,676
Percent black		**86%**	
Month	January	3	3
	February	4	4
	March	8	9
Day of the week	Monday	13	13
	Tuesday	11	10
	Wednesday	14	15
Time of day	(4-6 p.m.]	9	10
	(6-8 p.m.]	8	8
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Patrol borough	Brooklyn North	100	100
Precinct	B	98	98
	C	1	1
Outside		96	94
In uniform	Yes	99	97
Radio run	Yes	1	3

Examine Individual Officers for Evidence of Bias

Stop Characteristic		Example Officer (%) *n* = 392	Internal Benchmark (%) ESS = 3,676
Percent black		**86%**	**55%**
Month	January	3	3
	February	4	4
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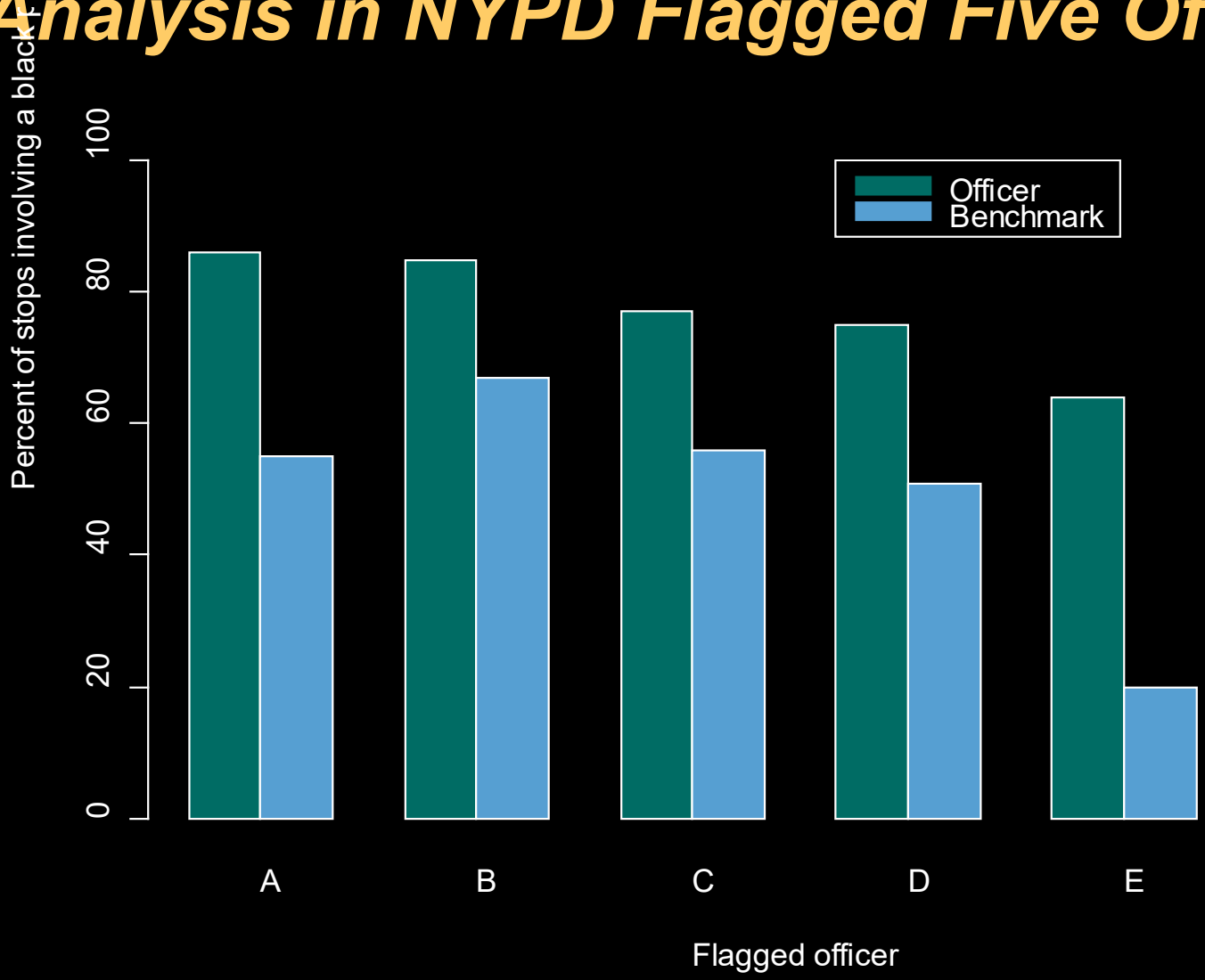
Patrol borough	Brooklyn North	100	100
Precinct	B	98	98
	C	1	1
Outside		96	94
In uniform	Yes	99	97
Radio run	Yes	1	3

Analysis in NYPD Flagged Five Officers



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- **Predictive policing is promising**
  - **Predicting sharp crime increases in Shreveport**

Predictive Policing Is Generating Great Interest

"As weather heats up, Chicago police study data for trends to help predict where violence will flare next"

- Chicago Tribune, July 4, 2010

- Predictive Policing has two key ingredients
  - Prediction model
  - Prevention model

- Ability to link the two models equates to success or failure of predictive policing

Initiatives Are Varied

- **Los Angeles PD – Improve upon the commander-drawn "mission maps" by using predicted crime rather than last week's crime**
- **DC Metro PD – Assign additional attention to probationers most at risk of reoffending**
- **Shreveport PD – Has valuable, but limited resources (drug teams, response teams) and must use them best**

Analysis with Shreveport PD Indicates that Some Crime Spikes Can Be Anticipated

Method	Percent correct
Assume no increase	
Predicted crime > 20%	-
Predicted crime < 20%	92%
Last week + District/ Month	
Predicted crime > 20%	43%
Predicted crime < 20%	96%
"Kitchen sink"	
Predicted crime > 20%	53%
Predicted crime < 20%	98%

While Last Week Is Important, the Trend and Other Factors Matter Too

Variable	Relative Influence
District	37.6
Crime, this week	14.1
Month	5.2
Crime, 1 week ago	4.6
Crime, 6 weeks ago	2.8
Crime, 8 weeks ago	2.7
Crime, 3 weeks ago	2.2
Crime, 2 weeks ago	2.1
Disorder calls, 1 week ago	1.5
Crime, 5 weeks ago	1.2
Disorder calls, 2 weeks ago	1.0
Other variables	25.0

Predictive Analytics Holds Promise for Police

- Prediction models have long been in use in insurance, finance, retail, telecommunications, travel, and medicine
- While promising and exciting… predictive policing is *untested*
  - Generated excitement in media
  - Generated excitement from analytic software companies
- RAND is conducting a randomized controlled trial of predictive policing at two sites

Summary

- Data and analysis must be combined with competent management
- Analysis has multiple uses in improving criminal justice outcomes
  - Contributes to problem-solving efforts
  - Forms the basis of predictive policing
  - Results in fact-based strategies
- Analysis can also improve the operation of criminal justice organizations
  - Assess the performance of operations, teams, and individuals
  - Evaluate initiatives

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