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NIJ

A Major Benefit for Law Enforcement
by Edwin Zedlewski and Mary B. Murphy

DIRECTOR'S MESSAGE

This issue of the *NIJ Journal* features articles on a wide range of interesting topics, beginning with a look at new uses for DNA identification. DNA samples collected from scenes of property crimes like burglary are being used to solve those crimes and other more serious crimes more often than ever before. In Miami, Palm Beach, and New York City, NIJ-funded pilot projects are helping test just how often this occurs by studying the impact of enhanced collection and analysis of DNA from many types of crimes. The story of how the testing identified serious offenders reflects the great potential DNA holds, especially as technology improves and costs decline.

Two other articles in this issue illustrate the varied ways technology serves criminal justice. An NIJ experiment shows that prisons and jails can use biometrics— a means of identifying persons through their physical characteristics—to track prisoners as they move through checkpoints in a facility, freeing correctional officers' time and attention. And computer-based mapping technology can locate hot spots of crime, group criminal incidents, and, through geographic profiling, predict likely areas where a criminal lives.

How does a domestic violence victim's interaction with police, courts, and service providers affect her future interaction with the criminal justice system? Three NIJ-sponsored studies looked at that question from different perspectives. The researchers found that victims who feel dissatisfied with the criminal justice system are less likely to report violence against them in the future. But, on a hopeful note, they also found that victims who use victim services are more likely to be satisfied with the criminal justice process and to have positive case outcomes. Without question, treating victims with respect and dignity is an imperative for our criminal justice system. This research suggests that providing the services victims need can also help them recover from their victimization and encourage them to report future crimes.

NIJ is continuing to work in new and different ways to provide the knowledge and tools necessary to meet the challenges of crime and justice. I hope you will see that reflected in this issue of our *Journal*.

Glenn R. Schmitt
Acting Director, National Institute of Justice

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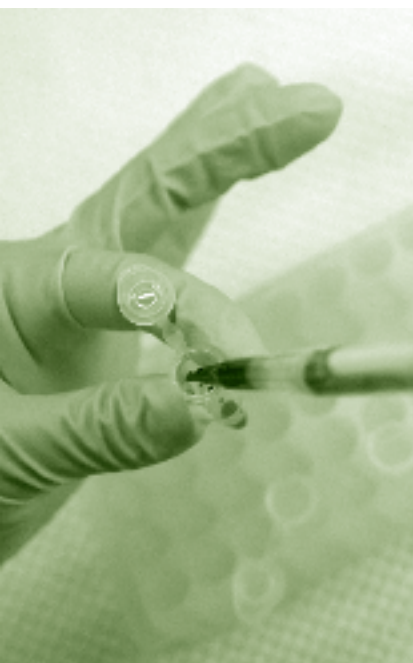
DNA Analysis for "Minor" Crimes:
A Major Benefit for Law Enforcement

by Edwin Zedlewski and Mary B. Murphy

About the Authors
Edwin Zedlewski is the Acting Deputy Assistant Director for Research and Evaluation at NIJ. Mary B. Murphy is the Managing Editor of the *NIJ Journal.*

When law enforcement officers arrive at the scene of a major crime, they routinely collect biological evidence: blood, semen, hair strands. The evidence goes to the crime lab, where forensic technicians analyze the DNA and run the "profile" against the national, State, or local DNA database, hoping to get a "hit" or match that will help bring the offender to justice.

Murders and sexual assaults receive top priority for DNA analysis, and officers routinely look for biological evidence at these crime scenes.[1] Property crimes, on the other hand, are a different story. In many cases, officers do not routinely collect biological evidence at property crime scenes—perhaps because they assume burglars do not leave DNA, or because departmental policies do not authorize that samples be taken at property crime scenes.

As more State legislatures expand the categories of offenders required to submit DNA samples, DNA databases continue to grow at a steady rate.[2] For example, notes William David Coffman, Crime Laboratory Analyst Supervisor–DNA Database at the Florida Department of Law Enforcement, Florida's database contained 74,301 samples in 2000. By 2004, that number had more than tripled to 236,491.[3] The increasing number of samples submitted and number of requests for analysis have generated oppressive caseloads for already understaffed crime labs. In response, the labs have had to relegate the analysis of DNA evidence from property offenses—if such evidence is recovered at all—to a back seat in favor of more pressing, high-profile cases. Untested DNA samples from property and other crime scenes are creating a massive backlog of untested samples. (See "Reducing the Backlog.")

But three NIJ pilot projects have demonstrated that analyzing DNA from property crimes can be extraordinarily useful. Officials at the Miami-Dade County Police Department, the New York City Police Department, and the Palm Beach County Sheriff's Office have

REDUCING THE BACKLOG

Recent years have witnessed a significant backlog of casework samples in crime labs across the country. In addition to the backlog of DNA evidence collected through case investigations, there is also a backlog of DNA data from known offenders waiting to be input into searchable databases. Furthermore, while many States have statutes authorizing the collection of DNA evidence from a variety of convicted offenders, substantial numbers of authorized samples have yet to even be collected, let alone analyzed. The convicted-offender backlog includes as many as 300,000 unanalyzed DNA samples from offenders convicted of crimes, with more than 500,000 samples yet to be taken.

While the number of DNA samples has grown, the ability of crime labs to analyze those samples has not kept pace. A number of factors contribute to the inability of labs to accept and process casework samples in a timely fashion. For one thing, most State and local crime labs lack sufficient numbers of trained forensic scientists and the funds to hire more staff. Even where funds are available, there is an insufficient pool of qualified forensic scientists to hire. In addition, many State and local crime labs lack the resources and lab space necessary to obtain and use state-of-the-art automated equipment and software that would speed up DNA analyses.

To address this problem, NIJ, at the direction of the Attorney General, convened a working group of Federal, State, and local criminal justice and forensic science experts to study the problem and submit recommendations on how to eliminate the backlog and build the Nation's capacity to routinely use DNA as an investigative tool. The recommendations include:

1. Improve the DNA analysis capacity of public crime laboratories.

2. Provide financial assistance to State and local crime labs to help eliminate casework backlogs.

3. Develop funding to eliminate convicted-offender database backlogs and encourage aggressive programs to collect owed samples from convicted offenders.

4. Support training and education for forensic scientists to increase the pool of available DNA analysts.

5. Provide training and education on the proper collection, preservation, and use of forensic DNA evidence to police officers, prosecutors, defense attorneys, judges, victim service providers, medical personnel, and other criminal justice personnel.

6. Support the development of improved DNA technologies, set up demonstration projects to encourage the increased use of DNA testing, and create a national forensic science commission to help ensure that the latest DNA and other forensic technologies are used to the maximum extent by criminal justice systems.

Subsequently, Congress passed a 5-year, $1-billion Presidential Initiative, "Advancing Justice Through DNA Technology," and in October 2004 passed the "Justice for All Act of 2004." The Act:

- Establishes enforceable rights for victims of crimes.
- Enhances DNA collection and analysis efforts.
- Provides for postconviction DNA testing.
- Authorizes grants to improve the quality of representation in State capital cases.

Learn more at http://www.DNA.gov.

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had success solving high-volume property crimes (like burglary and auto theft) as well as violent crimes (such as sexual assault and murder) using funds provided by NIJ. Although the initial goal of the project was to reduce the large backlog of DNA evidence waiting to be analyzed, participants made the unexpected discovery that analyzing DNA from property crimes can have major public safety benefits.[4]

Not an Innocent Crime

The benefits stem from the recognition that property offenders—burglars, in particular—pose a significant threat not just to those whose property they steal, but to the community at large. Bud Stuver, who heads the DNA Testing Program at the Miami-Dade County Police Department, notes that burglary is not the "innocent crime" that some people assume it to be.

For one thing, its victims suffer psychological trauma not measurable in monetary terms. For another the economic losses these victims experience are significant.[5] On top of that, burglary—despite its prevalence—has the lowest clearance rate of any Index crime.[6]

But the potential that burglars will commit more serious, violent crimes is perhaps the greatest danger posed by property crime offenders. Individuals who commit property crimes have a higher recidivism rate than those who commit other types of offenses, and their demonstrated potential to engage in more serious, violent behavior makes analyzing DNA evidence from property crimes not just an option, but a matter of necessity.

W. Mark Dale, former crime lab director at the New York City Police Department and now the director of the Northeast Regional

WHAT IS CODIS?

The Combined DNA Index System (CODIS) is an electronic database of DNA profiles administered through the Federal Bureau of Investigation. The system lets Federal, State, and local crime labs share and compare DNA profiles. Through CODIS, investigators match DNA from crime scenes with convicted offenders and with other crime scenes using computer software, just as fingerprints are matched through automated fingerprint identification systems.

CODIS uses two indexes: (1) the Convicted Offender Index, which contains profiles of convicted offenders, and (2) the Forensic Index, which contains profiles from crime scene evidence.

The real strength of CODIS lies in solving cases that have no suspects. If DNA evidence entered into CODIS matches someone in the offender index, a warrant can be obtained authorizing the collection of a sample from that offender to confirm the match. If the offender's DNA is in the forensic index, the system allows investigators—even in different jurisdictions—to exchange information about their respective cases.

Forensic Institute at the University of Albany, State University of New York, reports that in his experience, when no-suspect DNA from a murder scene is checked against CODIS—a database that allows Federal, State, and local crime labs to exchange and compare DNA profiles—it often yields a match with the DNA of a burglar. (See "What Is CODIS?") A review of New York's first 1,000 hits showed that the vast majority were linked to crimes like homicide and rape, but of these, 82 percent of the offenders were already in the databank as a result of a prior conviction for a "lesser" crime such as burglary or drugs.[7] In a Florida study, 52 percent of database hits against murder and sexual assault cases matched individuals who had prior convictions for burglary, notes Coffman.[8]

Worth What You Pay for It

Despite its proven value, expanding DNA analysis to property crimes is costly. The price tag depends on factors such as the fees paid to outside vendors for analysis, the type of testing needed, the number of samples tested per case, and the cost to have police collect biological evidence at property crime scenes and pursue investigative leads generated by CODIS.

The danger that property crime offenders will commit more serious crimes has convinced many that funding a larger database to include DNA from property crimes is

money well spent. Bud Stuver looks at affordability from the perspective of the costs to the justice system as a whole. "It is much more expeditious to employ DNA testing than to pay investigators [to track down leads]," he observes. In the same way, he notes, once a DNA result is in hand, it can substantially shorten what can be lengthy and costly court proceedings. Offenders may be more likely to plead guilty if they know the government's case-in-chief contains DNA evidence linking them to the crime.

NIJ Funding Made It Possible

With NIJ support, three crime labs were able to overcome the cost issue and send their no-suspect DNA samples to outside vendors for analysis. The good news was not just that the analyses yielded a large number of hits and helped clear the backlog of samples—it was also the surprisingly high proportion of hits against burglaries and the links discovered among these crimes.

In New York, for example, biological evidence from 201 burglaries yielded 86 "CODIS-acceptable" profiles.[9] On the basis of these numbers, the lab has been able to develop several pattern burglaries from these profiles. One profile uncovered a five-burglary serial offender. Most of New York's DNA profiles resulted in forensic hits to multiple unsolved cases. A few were linked to more serious, violent crimes such as sexual assault and robbery. More than three dozen burglary profiles have been linked through CODIS to other unsolved cases; more than 30 of the newly analyzed cases were matched through CODIS to convicted offenders and are under investigation.

Links among crimes are coming to light in two other sites. DNA in bloodstains collected at the scene of four household burglaries in Miami-Dade linked all four to the same offender, who turned out to have been previously convicted of another burglary. DNA evidence collected in Palm Beach also linked three different vehicle burglaries in which no suspect had been identified, and ultimately identified the perpetrator. He, too, turned out to be a previously convicted burglar. Overall, in Miami-Dade, 526 CODIS-acceptable profiles taken from unsolved cases produced 271 hits; in Palm Beach, 229 profiles produced 91 hits. Of the 362

samples matched through CODIS, more than half (56 percent) came from evidence collected at burglary scenes.

The success of these programs in using DNA evidence from property crimes to solve other cases is an example for other jurisdictions to emulate. Encouraging police officers to recognize and collect biological samples at property crime scenes is a major step in this direction, one already implemented by Miami-Dade County. Stuver, who is providing this training, works hard to convince officers that retrieving such evidence "is worth the time and effort."

Work Still to Be Done

But a hit doesn't mean the case is cleared—arrest, prosecution, and conviction must follow. NIJ is working with the sites to come up with ways to move beyond hits to successfully prosecuting offenders. This effort requires a balancing of resources among the law enforcement officers who collect the DNA evidence, the forensic specialists who analyze the samples, and the detectives who make arrests based on CODIS hits. Enhancing the ability of jurisdictions to generate CODIS-acceptable samples and ensuring that investigators use that evidence to build cases against offenders will go a long way toward maximizing the potential of DNA as a crime-solving tool.

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Notes

1. Lovrich, N.P., et al., *National Forensic DNA Study Report,* final report submitted to NIJ, 2003: 13 (NCJ 203970). Available at http://www.ncjrs.gov/pdffiles1/nij/grants/203970.pdf.

2. Today, every State has a DNA database statute that allows collection of DNA from specified offenders. All 50 States require DNA from sex offenders and murderers, and 46 States require DNA from all violent felony convictions (including assault and battery and robbery). Over the past several years, a growing number of States have been expanding their databases to include nonviolent felony convictions; 45 States require DNA from burglary convictions, 36 States require DNA from certain drug convictions, and 31 States require DNA from all felony convictions. (These figures are current through July 2003.) *National Forensic DNA Study Report,* Washington, DC: U.S.

ENGLAND'S USE OF DNA TO SOLVE PROPERTY CRIMES YIELDS GREAT SUCCESS

In 1995, England was propelled to the forefront of innovation in the use of DNA when it unveiled its National DNA Database (NDNAD). A progression of database laws in England and Wales has given law enforcement the right to collect samples and profile individuals arrested for, or suspected of, involvement in a crime—and not just violent crimes. Officials found that the database's usefulness as an investigative tool increased when it was expanded to include DNA from non-violent crimes such as burglary, car theft, and vandalism. Success also came from the short turnaround time from sample collection to DNA profiling. Biological samples from suspects and arrestees are typically analyzed within 5 days; crime scene analysis takes about 24 days.

Department of Justice, Office of Justice Programs, 2003: 37.

3. Source: Florida Department of Law Enforcement State DNA Database Statistics, Tallahassee, Florida.

4. The three sites were among several that received grants to reduce their DNA backlog. Nationwide, the number of cases that possibly have biological evidence not yet sent by local law enforcement agencies to crime labs or backlogged at the labs is more than one half million (542,700). *National Forensic DNA Study Report,* Washington, DC: U.S. Department of Justice, Office of Justice Programs, 2003: 3.

5. The economic loss for persons who were crime victims totaled $15.6 million in 2002; for property crime victims, it was $14.2 million (*National Crime Victimization Survey,* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, 2002: Table 82).

6. *Crime in the United States 2002: Uniform Crime Reports,* Washington, DC: Federal Bureau of Investigation, 2003: 221, 223. Burglary had the lowest clearance rate of any Index crime.

7. Source: http://criminaljustice.state.ny.us.forensic/dnabrochure.htm (retrieved from the World Wide Web on April 12, 2005).

8. Source: Florida Department of Law Enforcement State DNA Database Statistics, Tallahassee, Florida.

9. CODIS-acceptable profiles are those that meet the standards established by the National DNA Index System (NDIS). NDIS, the single, central repository of DNA records that is used to generate investigative leads, promulgates standards that ensure the reliability and compatibility of DNA profiles submitted by State and local law enforcement agencies. NDIS is distinct from the State DNA Index Systems (SDIS), which produce the majority of DNA hits.

Tracking Prisoners in Jail With Biometrics:
An Experiment in a Navy Brig

by Christopher A. Miles and Jeffrey P. Cohn

About the Authors

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Keeping track of inmates within a prison or jail is a constant challenge, especially as they move from one part of the facility to another. Monitoring their movements requires corrections officers to accurately identify individual prisoners by sight as they pass through security posts. It also requires frequent telephone and radio communications between officers at two or more security posts, paper passes authorizing inmates' movements, and dry-erase or clip boards with handwritten records to note when prisoners left one area and entered another. Despite the best precautions and well-thought-out practices, mistakes can be made, officers' attention can be diverted, and late-arriving inmates not noticed or searched for promptly.

Late-arriving, out-of-place prisoners can cause problems in correctional settings. If nothing else, it means that prison staff do not know where a particular inmate is at any given time. That prisoner may simply have stopped to chat with friends. Or, more seriously, he or she may be engaging in illegal activities. Assaults and even murders have been committed by inmates as they moved from one part of a prison or jail to another.

In an effort to improve how inmate movements are tracked within prisons and jails, the National Institute of Justice has been testing the use of biometrics at the U.S. Naval Consolidated Brig in Charleston, South Carolina. The $1 million technology demonstration project is a joint effort of NIJ, the U.S. Navy's Space and Naval Warfare Systems Center, the Charleston brig, and the U.S. Department of Defense's (DoD's) Biometrics Management Office.

Biometrics has been used previously to track the movement of staff, visitors, and prisoners in and out of correctional facilities. It has also

been used to account for staff members in the event of a riot or other prison disturbance. This project represents the first use of biometrics to track prisoner movements within a prison or jail. It was designed to employ computer-based methods of tracking inmates to improve the efficiency of corrections specialists[1] and brig officials and to demonstrate how advanced technology can make corrections facilities safer.

Identifying Inmates

Called the Biometric Inmate Tracking System (BITS), the project was implemented in phases that, together, transformed the existing manual system into a computer-based system and then into a biometric- and computer-based system. In carrying out that transformation, project designers had to find the biometric method that would work best at the Charleston brig and then develop computer software capable of identifying and verifying individual inmates based on their biometric characteristics. The software also had to be easy enough to operate so that corrections specialists with limited prior training or experience on computers could understand how to use it.[2]

All biometric methods—iris, facial, retinal, finger and hand geometry, voice, and fingerprint—were tested over a 3-year period. All had been developed, tested, and used in other settings, mostly by commercial firms. And all were found to have advantages and disadvantages at the Charleston brig. Facial recognition produced too many false positives on prisoners. Although biometric methods do not have to work every time to be effective, corrections specialists had to visually identify the prisoners too often, thus slowing the process. Iris recognition was the most accurate method tested at the Charleston brig, but it was similarly judged too slow to work effectively in a jail setting. Voice recognition proved to be the least accurate method tested.

In the end, the fingerprint recognition method, now used in conjunction with hand geometry, was judged to work best at the Charleston brig. It provided the most accurate and reliable matches at about one-third the cost of iris, facial, and retinal methods. The fingerprint method also moved prisoners through the gates faster than the others. That's a prime

WHAT IS BIOMETRICS?

The term "biometrics" refers to a variety of methods to verify a person's identity using physiological or behavioral characteristics such as iris, retinal, and facial recognition; hand and finger geometry; fingerprint and voice identification; and dynamic signature. It has the advantage of not requiring a person to remember a user name, password, or series of numbers while confirming that the person is who he or she claims to be. Practical uses of biometrics include allowing persons access to keyless cars, rooms, and buildings; to financial and other personal accounts; and to the departure areas of airport terminals. More broadly, it is used to prevent identity theft, preserve the confidentiality of information, and reduce fraud.

Biometric systems can use several different physical and/or behavioral characteristics for identification and verification. Some are more technologically and commercially advanced than others. Determining which biometric method to employ depends on how the system is to be used, the level of accuracy and reliability required, and other factors such as cost and speed. Biometric methods can also vary significantly from one application to another and even from one vendor to another.

Biometrics systems are usually deployed using a three-step process. First, a camera, scanner, or other sensor takes an image or picture. Second, that image is made into a pattern called a biometric signature. For example, with fingerprints the signature comprises minutia points along a finger's ridges, splits, and end lines. Voice recognition involves patterns of cadence, pitch, and tone. Hand and finger geometry measures physical characteristics such as length and thickness.

Third, the biometric signature is converted into a template using a mathematical algorithm. Templates contain biometric and other data in the form of numbers that are either embedded on a plastic card or stored in a database. Some systems use a card that can be inserted in or held near a scanner that feeds the information on the card into a computer. Other systems do not require a card; they simply scan the biometric data. In either system, the computer compares the biometric signature captured by the scanner with those already in its files to find the correct or closest match.

NIJ and DoD began examining biometric techniques for criminal justice purposes in 2000. As part of that effort, NIJ and DoD identified the Charleston naval brig as a demonstration site. The brig is a relatively small, well-managed jail with approximately 400 mostly low-risk prisoners. The Navy wanted to upgrade security at the brig and make it more efficient. At the same time, the adjacent Space and Naval Warfare Systems Center was available to help develop the biometrics system and the computer software necessary to run it.

In the end, the fingerprint recognition method, now used in conjunction with hand geometry, was judged to work best at the Charleston brig. It provided the most accurate and reliable matches at about one-third the cost of iris, facial, and retinal methods.

consideration when, for example, corrections specialists are moving 50 or more prisoners at once from housing or work areas to the galley at mealtime. Fingerprint readers were also easier to use and more durable than other readers.

Tracking Inmates

In the next phase, the manual dry-erase board and paper system was replaced with a computerized tracking system in which a server contained all data on inmate movements. Brig staff could access the data from each housing unit, the control center, and the enrollment area. Biometric scanners were then added to further verify the location of prisoners.

As the system now works, the computer finds a biometric match, identifies the individual prisoner, and confirms that he or she is authorized to go from one part of the brig to another. The computer also sends a message to the next security post on the prisoner's authorized path that the prisoner is on his or her way. No escort or paper record is necessary because the computer records all prisoner movement between security posts at different parts of the brig. If a prisoner fails to show up within a specified time, usually 5 minutes, an alarm is sounded and the staff are alerted that a prisoner is out of place.

Evaluating the Project

Almost from the beginning, outside experts were engaged to help NIJ and the U.S. Navy evaluate how well the computer tracking and biometrics systems worked, if they made the Charleston brig safer, and whether they worked better than the manual system they replaced. Initially, evaluators conducted surveys of brig staff taken before the biometric system was fully in place. The surveys showed that the corrections specialists and other brig officials thought the existing system for tracking prisoner movements worked fine most of the time.

To test that assumption, evaluators asked brig officials to "grab" and hold a prisoner who was authorized to move from one part of the brig to another after that prisoner

had passed through the first security post. By so doing, they deliberately caused a prisoner to be late and out of place, thus creating a security breach. The results showed that the Charleston brig's manual system did not work as well as its staff had thought.

Under the manual system of tracking inmate movements, the corrections specialists failed to note a prisoner's nonarrival in all 12 test grabs. Under the manual system, it took corrections specialists an average of 43 minutes to notice an out-of-place prisoner. In half the cases, more than 1 hour passed before the corrections specialists realized the situation. Once the computer tracking system was introduced, however, the average time it took for staff to notice a nonarriving inmate dropped to 17 minutes. In only 1 of 10 cases did more than 1 hour pass.

At the same time, the computer tracking system improved the efficiency of corrections specialists and other brig officials. Most corrections specialists learned the new system quickly, which, when mastered, calls for less reliance on their memory of individual prisoners and provides automatic warnings when prisoners are deemed out of place. The system frees corrections specialists from handling paper passes, allowing them to spend more time actually watching prisoners in their area. And that translates into improved staff efficiency. So, too, do the fewer outgoing telephone and radio calls made by the corrections specialists to ensure that a prisoner has actually arrived at the next post on time. Once again, that means more time for staff to spend actually watching prisoners.

Next Steps

NIJ and project staff plan to take what has been learned at the Charleston naval brig and apply it to a larger, civilian prison. The goal is to develop the technology, software, and methods to use biometrics in any prison or jail in the United States.

Challenges lie ahead: Technological developments continue to change the relative merits of the different recognition and verifica-

tion methods. A civilian prison represents a riskier, higher use setting than a military jail for biometrics to work, so a different set of criteria will need to be developed to evaluate which systems work best. For example, equipment durability may be more important because of higher volumes of use and because of the increased potential for deliberate vandalism by inmates likely to damage equipment designed to track their movements.

The Charleston brig test is not yet completed—final evaluations of the full biometric and computer system remain to be finished and analyzed. Yet project staff are optimistic that with further testing

and analysis, biometrics technology can be used successfully in U.S. prisons and jails to identify and track inmates.

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Notes

1. The military job classification "corrections specialist" is comparable to the civilian "corrections officer."

2. The Biometric Inmate Tracking Software, *InmateTrac,* is a Government Off-the-Shelf (GOTS) product that runs using open source software that is available for free to the correctional community. For software configuration and administration require-ments, please contact Michael Besco at Michael.Besco@navy.mil.

NIJ and Harvard University Host Webcasts on Less Lethal Force and DNA in "Minor" Crimes

NIJ disseminates information to policymakers and practitioners in a number of ways. One of the newest is a series of online discussions about innovations in public safety. The series is produced through the collabora-tive efforts of Harvard University's Ash Institute for Democratic Governance and Innovation, NIJ, and OJP. NIJ is providing subject matter expertise, marketing assistance, and logistical support to the series.

- **Less Lethal Force**

  The first online discussion, "Less Lethal Force: An Online Session on Emerging Issues and Where to Learn More," was emceed by then-Assistant Attorney General Deborah J. Daniels and Harvard University Professor of Government Stephen Goldsmith. Police Executive Research Forum Executive Director Chuck Wexler served as moderator.

  The practitioner perspective was given by Thomas Streicher, Cincinnati Chief of Police, and Clark Kimerer, Seattle Deputy Chief. Research findings were discussed by Robert Kaminski of the University of South Carolina and David Klinger of the University of Missouri–St. Louis. The online discussion included multi-media presentations and multiple modes of interaction between the audience and presenters.

- **DNA in "Minor" Crimes**

  The second online discussion, "DNA in 'Minor' Crimes Yields Major Benefits in Public Safety," showcased how police departments across the United States and around the world are discovering that biological evidence from property crime scenes can play a significant role in preventing future property crimes and more serious offenses.

  The discussion featured Dr. Cecelia Crouse, DNA Technical Leader and Supervisor of the Palm Beach County Sheriff's Office Crime Lab, Dr. Peter Pizzola, Director of the New York City Police Department Crime Lab, and Paul Hackett, National DNA Business Manager for the Forensic Science Service in the United Kingdom.

Archives of these two sessions and announcements of future sessions can be found on the Ash Institute's Government Innovators Network Web site (http://www.innovations.harvard.edu). The site was launched in November 2004 with the aim of becoming an e-marketplace of ideas for senior-level policymakers and practitioners.

Predicting a Criminal's Journey to Crime

P hil Canter sits at his computer desk at the Baltimore County Police Department's main office in Towson, Maryland. Canter calls up the menu for CrimeStat, a computer program that helps police organize data and analyze crime patterns. Canter makes a selection from the program, then calls up Regional Crime Analysis Geographic Information System (RCAGIS), another crime-fighting computer program.

Soon, a detailed street map of Baltimore County appears on the computer screen. With a few more keystrokes, Canter zooms in on one part of the county. Next, he pulls up a list of all sexually related home burglaries that have been reported in that area within the past 6 months. With a few more keystrokes, Canter locates the precise sites of each reported crime on the map, along with the area's buildings, waterways, and other manmade and natural features. Then he adds a list of known sexual offenders, separates them by method of operation, and keys in their last known addresses. Eventually, a list of possible suspects is generated.

Location: The Key to Solving Crimes?

The utility of these computer programs as crime-solving tools is promising. "We can use computer programs to analyze crime patterns and depict geographically where certain crimes are clustered, relate those crimes to the environment in which they occur, and identify where the potential suspects most likely live," says Canter, chief statistician for the Baltimore County Police Department. "That's as important [to solving crimes] as a suspect's description. It helps police understand better the areas where crimes occur. And it lets them focus on suspects with the highest probability of [having committed] the crime."

In recent years, several police departments have added computer programs to their arsenal of anti-crime tools. Although still an imprecise science, computer programs have been or are being developed that can help police locate crime "hot spots," spatially

relate a list of potential suspects to actual crimes, profile crimes geographically to identify where a serial criminal most likely lives, and even forecast where the next crime in a series might occur.

One of the oldest approaches to using computers to analyze crime patterns is known as geographic profiling. Developed in the late 1980's, geographic profiling involves the use of computer models to spatially analyze crime sites so that investigators can determine the most likely areas where an offender lives. "Geographic profiling assigns probability values to particular geographic areas," says D. Kim Rossmo, a research professor at Texas State University in San Marcos who helped develop the model. "It tells police where to look first."

Geographic profiling is most useful, Rossmo says, in cases where the same person or group of persons has committed a number of crimes such as murders, sexual assaults, robberies, bombings, or arsons. It is particularly helpful when offenders commit crimes at different sites, where two crimes are committed at once (such as a rape in which the victim's purse is also stolen), or in cases where an assault or theft victim's credit card is subsequently used at various locations.

In undertaking geographic profiling, Rossmo and other trained profilers typically review the case files and talk to police investigators to make sure that the case is an appropriate one for this specific approach. Next, profilers tour the crime sites to visualize what happened and see if anything was missed. Then they run the information through Rigel^{TM}, a computer software package that analyzes crime sites. The profiling process, which includes preparation of a written report identifying the most probable areas where an offender might live, usually takes about 2 weeks, he says. As a result, most profilers are only able to complete about 20 cases a year. As a practical matter, that limits opportunity to use geographic profiling to cases of local or national significance.

Although still an imprecise science, computer programs have been or are being developed that can help police locate crime "hot spots," spatially relate a list of potential suspects to actual crimes, profile crimes geographically to identify where a serial criminal most likely lives, and even forecast where the next crime in a series might occur.

CrimeStat: Hitting Home

CrimeStat, one of the models used by Baltimore County's Canter, is a stand-alone spatial statistics program for the analysis of crime incident locations. Developed under grants from NIJ to Ned Levine and Associates, CrimeStat III Software is free and can be downloaded from the Internet at http://www.icpsr.umich.edu/NACJD/crimestat.html.[1] The program makes use of data derived from geographical information systems (GIS), which combine digital, computer-generated maps with data that can be displayed and manipulated. CrimeStat includes a component known as the journey-to-crime module, which is one aspect of the multifaceted geographic profiling technology.

CrimeStat builds on one simple concept: criminals have to start from somewhere when they set out to commit a crime. On the basis of the location of incidents committed by the serial offender, the journey-to-crime module makes statistical guesses about where the criminal is likely to reside. Those guesses are based on the travel patterns of a sample of known serial offenders who committed the same type of crime. Based on the theory that most crimes are committed close to an offender's home, the module estimates the distance serial offenders travel to commit crimes and, by implication, the likely location from which they begin their "journey to crime."

"If we can better understand crime as a series of trips in time, space, and distance," observes Ned Levine, "maybe we can begin to predict where crimes will be committed and where the offenders came from." To accomplish this goal, however, more complex and realistic computer programs must be developed.

The presumption underlying this analysis is that offenders, when confronted with more than one possible location for committing a burglary, will select the one with the greatest potential payoff and the least travel time. This pattern may vary, however, by type of crime. For example, although most rapes, burglaries, assaults, and other crimes of opportunity fit this pattern, more deliberative crimes—like auto thefts and commercial robberies—may occur farther from home, maximizing the offender's potential reward and decreasing his or her risk of being recognized. By plotting the location of crimes committed by a serial offender and then using a model of travel distance to estimate the offender's likely area of origin, the program attempts to lead law enforcement officers to the offender's own neighborhood.

But Do They Really Work?

Beyond serving as research projects and interesting toys for crime analysts, the key question remains: Do sophisticated computer programs work? The answer isn't a simple "yes" or "no."

Daniel Helms, a crime analyst with the National Law Enforcement and Corrections Technology Center (NLECTC) in Denver, believes they do. Computer models "are not a magic bullet, but they are powerful tools [that] give police a better starting place for following up leads and checking out lists of known offenders," he says.

To illustrate his point, Helms cites the case of the Las Vegas, Nevada, police who used CrimeStat and other computer models to identify a probable area where a serial killer lived. Based on that information, police canvassed a large apartment complex in that area and questioned residents if they had seen anyone who matched the description of the killer. Normally, the police might have overlooked that apartment complex because it was not the residence of any known suspect; however, because of the information provided by CrimeStat, they staked out the complex and ultimately arrested a suspect. In this case, CrimeStat gave police an "insight into crime and criminals not available before," Helms says.

The case of the "blue bandana bandit" in Glendale, Arizona, is another example of the value of computer models in solving crimes. In this case, police knew that a suspect wearing a blue bandana had committed a series of robberies at a chain of convenience stores. Glendale crime analysts and police detectives used a geographic information system to plot where the robberies had occurred and then used CrimeStat to predict where the next one might take place. Police staked out that convenience store and made an arrest.

Critics Weigh In

But not all crime analysts are convinced that geographic profiling and other computer models work that well. Richard Block, a professor of sociology and criminal justice at Loyola University in Chicago who works on CrimeStat and other computer models, questions their utility. "[Computer models] have not been adequately tested to know whether they will work better than a detective's intuition," he observes. "This is a very new field that is still being developed."

The belief that no computer model, however effective, will eliminate the need for good old-fashioned police work is shared by critics and proponents alike. "Police still need to use their own intuition and other information when investigating crimes," Phil Canter acknowledges. "Computer models supplement what detectives find on their own. They can provide insights into the travel patterns of criminals, but we should not take them as gospel."

Effectiveness Depends on Law Enforcement Input, Acceptance

A related problem, Canter notes, is that CrimeStat and other computer programs depend on the accuracy and thoroughness of the information obtained by law enforcement officers. Sometimes the most basic GIS data are incorrect, especially the addresses of known offenders and other suspects. Too often, notes Brian Hill, a police department crime analyst in Glendale, Arizona, officers have to rely on self-reported data from unreliable witnesses and suspects.

Additionally, many police officers are not familiar or experienced enough with sophisticated computer programs to use CrimeStat and other programs effectively. Using these programs requires training as well as an ability to understand technical manuals and interpret statistical results. "You can't just plug in the computer and start the program," NLECTC's Helms adds. "You have to understand how it works."

Origins of Journey May Vary

More importantly, offenders may not always start their journey to crime from home, says Derek Paulsen, assistant professor of criminal justice at Eastern Kentucky University in Richmond. In some cases, criminals may start from their workplace, or a friend's or relative's home. Alternatively, the journey may start from a spot where the individual hangs out— which may also be the place where he or she purchases drugs. And because criminals tend to move so often, an address that is correct one day may be out of date the next. These variables directly impede analysts' abilities to identify a criminal's journey to crime. Applying this theory is more complicated than drawing a straight line from a suspect's home to a crime site.

Moreover, today's mobile society makes predicting where offenders started their journey to crime based on known crime sites very difficult. Take, for example, the case of the snipers who launched a series of random shootings in 2002 that terrorized Washington, DC, and its suburbs, killing 10 people and wounding another 3. Despite using geographic profiling and other computer models in one of the most intense police manhunts in U.S. criminal history, the suspects were identified based on clues provided by one of the snipers about a seemingly unrelated case in Alabama. Moreover, despite implementation of a massive law enforcement dragnet for the two suspects, they were ultimately caught after an alert motorist saw them sleeping in their car—50 miles from the closest crime scene.

The sniper case also illustrates the limits of any computer program to adequately analyze the complexity of human behavior, says Ronald Wilson, program manager of the Mapping and Analysis for Public Safety (MAPS) program at NIJ. "There is a lot in human behavior that cannot be accounted for by mathematical models," Wilson notes, pointing to the more intelligent criminals who deliberately try to vary their methods of operation to confuse or foil police.

Looking Into the Future

How long will it take before sufficient research and testing have been completed and CrimeStat and other computer programs can be recommended for use by police departments? Loyola University's Block predicts they may be sufficiently accurate and reliable to use in a year or two. "They have a lot of promise," he says. "They are a potentially very useful tool in solving crimes."

In the end, however, no single police technique will work every time for every case. In some cases, computer programs may provide the key to solving crimes; in others, however, traditional police work will make the difference. "If we can better understand crime as a series of trips in time, space, and distance," observes Ned Levine, "maybe we can begin to predict where crimes will be committed and where the offenders came from." To accomplish this goal, however, more complex and realistic computer programs must be developed.

NCJ 212264

Note

1. For additional information on crime mapping and related software, consult NIJ's MAPS (Mapping and Analysis for Public Safety) program at http://www.ojp.usdoj.gov/nij/maps.

Books in Brief

The following books were produced, in whole or in part, from research funded by the National Institute of Justice.

Juvenile Drug Courts and Teen Substance Abuse

Jeffrey Butts and John Roman, eds., Washington, DC: The Urban Institute Press, 2004.

Drug courts have been used in adult courts for years, but their use in the juvenile justice system is a new phenomenon. Although the number of juveniles affected by these drug courts remains small, the programs are spreading, and their presence is affecting how practitioners and policymakers view drug abuse among juveniles.

With data compiled through the NIJ-sponsored National Evaluation of Juvenile Drug Courts project, the Urban Institute has published *Juvenile Drug Courts and Teen Substance Abuse*. Edited by Jeffrey Butts, director of the Urban Institute's Program on Youth Justice and a senior research associate in the Justice Policy Center, and John Roman, a senior research associate in the Urban Institute's Justice Policy Center, this is the first book to delve into the ideas behind juvenile drug courts, their history, and their popularity. The editors recruited justice policy experts to assess evidence of the impact and effectiveness of the programs and to help guide the future development of juvenile drug courts.

Chapter topics include: "Drug Courts in the Juvenile Justice System," "American Drug Policy and the Evolution of Drug Treatment Courts," "What Juvenile Drug Courts Do and How They Do It," "Drug Court Effects and the Quality of Existing Evidence," "Defining the Mission of Juvenile Drug Courts," "Identifying Adolescent Substance Abuse," "Shaping the Next Generation of Juvenile Drug Court Evaluations," and "Building Better Evidence for Policy and Practice."

For more information, visit http://www.urban.org/pubs/JuvenileDrugCourts.

Evaluating Gun Policy: Effects on Crime and Violence

Jens Ludwig and Philip J. Cook, eds., Washington, DC: The Brookings Institution Press/Brookings Metro Series, 2003.

Gun policy is a hot topic in the United States. In an effort to restrict high-risk groups' access to firearms while preserving the gun rights of low-risk individuals, various initiatives and laws have been enacted. But are these policies working? Are they affecting crime rates?

Evaluating Gun Policy: Effects on Crime and Violence provides guidance for a pragmatic approach to gun policy using empirical research to help resolve conflicting assertions about the effects of guns, gun control, and law enforcement. Edited by Jens Ludwig, associate professor of public policy at Georgetown University, and Philip J. Cook, the ITT/Terry Sanford Distinguished Professor of Public Policy Studies at Duke University, the book strives to include both sides of the debate—to provide a "skilled and

dispassionate analysis" of gun policy issues. Produced in part with NIJ funds, the book contains six chapters that examine the success of Richmond-based Project Exile in reducing homicide rates, whether gun ownership deters burglaries, whether concealed-carry laws reduce crime, the status and number of existing gun control laws, whether policing reduces the number of illegal guns in the community, and the effectiveness of laws restricting the right of domestic batterers to possess a firearm.
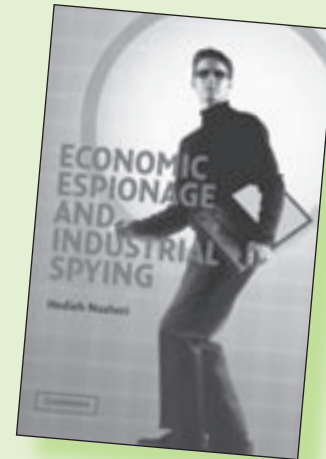
For more information, visit https://www.brookings.edu/press/books/evaluatinggunpolicy.htm.

Economic Espionage and Industrial Spying

Hedieh Nasheri, Cambridge, England: Cambridge University Press, 2005.

Economic espionage is a relatively new form of white-collar crime. The United States passed the Economic Espionage Act of 1996; however, rapidly changing technologies have raised important implications for future research and the use of criminal sanctions and civil penalties in this dynamic landscape.

Economic Espionage and Industrial Spying, written by Hedieh Nasheri, an associate professor of justice studies at Kent State University and a visiting professor at the University of Turku in Finland, investigates the impact of these technology-related crimes and examines the far-reaching effects of advances in computer and wireless communications.

Nasheri analyzes the foundations of economic espionage, trade secret thefts, and industrial spying; shows how these activities affect society; and then looks at the legal efforts used to control them. The book examines more than 40 international espionage cases and explores the legislative initiatives undertaken by the United States to combat the rising tide of economic espionage and trade secret theft.

The book is based on research funded, in part, by a grant from NIJ's International Center.

For more information, visit http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=0521543711.

Victim Satisfaction With the Criminal Justice System

New research suggests that victims of domestic violence who initially turn to the criminal justice system for intervention may be so dissatisfied with the outcome that they do not call the police the next time they need help.

Researchers Eve Buzawa and the late Gerald Hotaling asked women in 353 domestic violence cases in the Quincy District Court (QDC) in Quincy, Massachusetts, to assess the role of the police, prosecutors, victim advocates, and judges and to rate their level of satisfaction.[1] They found that in 55 percent of the cases, women were generally satisfied with the outcome. In 17 percent, victims were dissatisfied.

The researchers found several common variables in the satisfied cases: the incidents were less serious, the offender was less dangerous, the victim said she felt some control and wanted the case to go forward, and the victim reported experiencing less violence in her past.

Dissatisfied victims appeared to have been involved in more serious incidents with highly dangerous offenders and were more likely to have disagreed with the police about the offender's arrest. These victims were also 16 times more likely than satisfied victims to report that they had experienced both sexual and severe physical abuse before the age of 18. As a group, dissatisfied victims appeared to be more willing to leave offenders or unwilling (or afraid) to directly confront the abuser, even if they were separated.

For the researchers, the bottom line was that victim satisfaction in domestic violence cases appeared to hinge on the extent to which the victim felt control over ending the violence in the incident, control over her offender's future conduct—and even over the criminal justice system. When the victim had a low sense of control, satisfaction with the system decreased significantly.

Consequences of Victim Dissatisfaction

Having identified the common variables in cases of satisfied and dissatisfied victims, Buzawa and Hotaling then examined what, if any, consequences flowed from dissatisfaction. The second stage of the study focused on the connection between victim dissatisfaction and willingness to report future victimizations. The researchers tracked 118 women for a year after the original study to see if they reported any new incidents or sought civil restraining orders.

Of the 118 women, 49 percent admitted that they had been revictimized. Of these, 22 percent reported the incidents to the police. Contrary to the presumption that "more serious" offenses get reported to the police, victims who reported the new incident were more likely to report less serious offenses, like violations of restraining orders, than they were to reach out for assistance due to a physical assault. Women who

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reported new abuse to the police also generally reported that the abuse was becoming more serious.

Women who chose not to report new incidents of abuse were:

- The least likely to have resisted the arrest of the offender during the first incident.
- The least likely to have been dissatisfied with how the police initially handled the incident.
- The most likely, by the conclusion of the case, to feel that the actions of the police

BALANCING DIFFERENT PERSPECTIVES

In the past, victims of domestic violence often expressed dissatisfaction with the lack of aggressive response to domestic assault by police, prosecutors, and the courts. Now, researchers have discovered, the pendulum may have swung the other way.

Mandatory arrest policies in many jurisdictions and implementation of "full enforcement" protocols have resulted in more cases being prosecuted whether the victim wants to proceed or not.

Women who are the victims of domestic abuse usually want to enhance their own safety, maintain economic viability, protect their children, and have an opportunity to force an abuser to participate in batterers' counseling programs. They are less concerned about upholding the law or deterring future abuse—the main objectives of the police, prosecutor, and judge.

Treating victims with respect, offering them positive encouragement, refraining from engaging in negative interactions, and most importantly, creating a sense of control increased the odds of positive outcomes in the victim's view.

negatively affected their safety and to complain that they wanted the prosecutor to make charges against the offender more severe.

Women who chose not to report new incidents of abuse also were likely to have experienced sexual abuse as a child. This finding coincides with other research that suggests a link between a woman's history of abuse and her likelihood of reporting revictimization to police. The researchers theorize that "for an individual who has experienced abuse through the 'life course,' reporting this latest incident to the police may be viewed as a useless ritualism."[2]

Victim Services Increase Positive Experiences

Women who take advantage of victim service programs tend to have more positive outcomes and are more likely to report satisfaction, according to one study.[3] Researchers found that women benefit the most when the criminal justice system and nonprofit and community-based agencies collaborate and coordinate their efforts. Such cooperation results in more positive outcomes and greater victim satisfaction. Treating victims with respect, offering them positive encouragement, refraining from engaging in negative interactions, and most importantly, creating a sense of control increased the odds of positive outcomes in the victim's view.

Researchers concluded that the most positive outcomes occur when the staff at service agencies listen to women, carefully explain the options, and then take action. "Women know best about their own safety and well-being, and when they have a greater sense of control while working with agencies, they find the services more helpful and effective."[4]

Ensuring that victim service programs work in conjunction with the legal system and community agencies and that staff address victims' needs in a positive manner will encourage victims to turn to the criminal justice system for assistance and may maximize the potential to break the cycle of violence.

NCJ 212265

Notes

1. QDC was chosen as a data collection site because it is an acknowledged leader in implementing strategies that favor criminal justice intervention in domestic violence cases. Over a 7-month period in 1999, researchers interviewed victims to obtain their assessments of the role of police, prosecutors, victim advocates, and judges. Researchers also studied victims' satisfaction with various sectors of the criminal justice system.

2. Hotaling, Gerald T., and Eve S. Buzawa, *Forgoing Criminal Justice Assistance: The Non-Reporting of New Incidents of Abuse in a Court Sample of Domestic Violence Victims,* Washington, DC: U.S. Department of Justice, National Institute of Justice, 2003: 25 (NCJ 195667).

3. Zweig, Janine, Martha R. Burt, and Ashley Van Ness, *Effects on Victims of Victim Service Programs Funded by the STOP Formula Grants Program,* Washington, DC: U.S. Department of Justice, National Institute of Justice, 2003: 16 (NCJ 202903).

4. Ibid., 19.

Publications of Interest From NIJ

Identifying Victims Using DNA: A Guide for Families
April 2005

This 8-page booklet, part of the President's DNA Initiative, explains the process of identifying remains using DNA analysis. It gives an overview of the process so that surviving family and friends will understand what DNA analysis can and cannot do, describes the sources of DNA that forensic scientists might use, and explains the differences between nuclear and mitochondrial DNA.

American Indian Suicides in Jail: Can Risk Screening Be Culturally Sensitive?
June 2005

Do jail inmates' cultural backgrounds affect how they react to authorities' attempts to assess their risk for suicide? A recent NIJ study found that the screening question-naire used by a county jail located near Indian lands failed to elicit direct responses about personal matters from American Indian detainees. Findings suggest that tailoring suicide risk assessment protocols to the cultural backgrounds of detainee populations might be more effective.

Mass Fatality Incidents: A Guide for Human Forensic Identification
Technical Working Group for Mass Fatality Forensic Identification
June 2005

In a mass fatality incident, correct victim identification is essential to satisfy humanitarian considerations, meet civil and criminal investigative needs, and identify victim perpetrators. This 96-page Special Report provides medical examiners/coroners with guidelines for preparing the portion of the disaster plan concerned with victim identification and summarizes the victim identification process for other first responders. It discusses the integration of the medical examiner/coroner into the initial response process, and presents the roles of various forensic disciplines (including forensic anthropology, radiology, odontology, fingerprinting, and DNA analysis) in victim identification. This guide represents the experience of dozens of Federal, State, international, and private forensic experts who took part in the Technical Working Group for Mass Fatality Forensic Identification.

Stress Among Probation and Parole Officers and What Can Be Done About It
June 2005

Probation and parole officers experience a great deal of job-related stress. A recent study investigated the nature and scope of the problem at nine sites around the country. Researchers identified the major sources of stress (heavy caseloads, paperwork, deadlines) and what officers do to cope. This Research for Practice summarizes key findings and provides case studies of promising stress reduction programs.
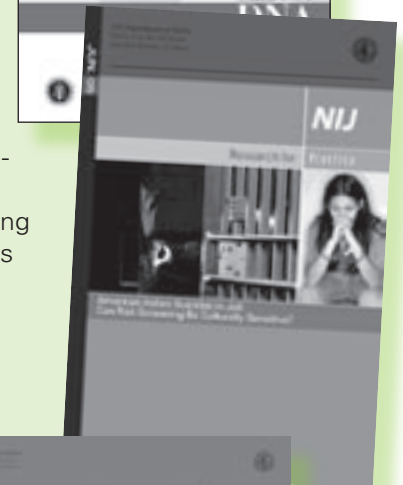
At-A-Glance: Recent Research Findings

HOW TO GET AT-A-GLANCE MATERIALS

Materials are available at:

- NIJ's Web site at http://www.ojp.usdoj.gov/nij, or

- NCJRS, puborder@ncjrs.org, 800–851–3420, P.O. Box 6000, Rockville, MD 20849–6000, http://www.ncjrs.org.

The summaries in this section are based on the following:

RESEARCH IN PROGRESS SEMINARS. At these seminars, scholars discuss their ongoing research and preliminary findings with an audience of researchers and criminal justice professionals. Sixty-minute VHS videotapes of the Research in Progress seminars are available from the National Criminal Justice Reference Service (NCJRS) at 800–851–3420. Videotaped seminars are $19 ($24 in Canada and other countries).

NIJ FINAL REPORTS. These final submissions from NIJ grantees typically are available from NCJRS through interlibrary loan. In some cases, photocopies may be obtained for a fee. For information about these reports and possible fees, contact NCJRS.

NIJ PUBLICATIONS. Some of the information here is summarized from recent NIJ publications, which are available from the NIJ Web site or by contacting NCJRS. Refer to the documents' accession (ACN) or NCJ numbers.

Police Responses to Officer-Involved Shootings

What goes through police officers' minds when they are involved in shootings? How does facing deadly force affect what they see, hear, and feel? Prior research has found that many officers involved in shootings suffer from "postshooting trauma"—a form of posttraumatic stress disorder that may include guilt, depression, and even suicidal thoughts.[1] However, it may be that officers are more resilient than previously thought. One study has found that most suffer few long-term negative emotional or physical effects after shooting a suspect.

The study explored the emotional, psychological, and physical reactions of 80 officers and sheriff's deputies during and after 113 incidents in which they shot someone, using a combination of questionnaires and personal interviews.

Among the findings:

- Most officers reported that just before and as they pulled the trigger on the suspect, they experienced a range of psychological, emotional, and physiological reactions that

SNOWBALL SAMPLING TECHNIQUE

The researcher used a convenience or "snowball" sample rather than a random sample. The initial study participants were police officers and sheriff's deputies in four States whom the researcher had worked with or otherwise knew. These participants then referred other officers to take part in the study. (The sample size grows, or "snowballs," as more and more participants refer others.) The researcher chose a snowball method rather than a random sample because these officers were more likely to respond to the often sensitive questions and to be frank about their experiences, both positive and negative, during and after the shooting than officers in a random sample would have been. Given this, some caution should be used in generalizing these findings.

distorted time, distance, sight, and sound. (See table 1.) Many officers found their recollection of the events of the shooting to be imperfect. In extreme cases, officers could not recall firing their guns. In the days, weeks, and months that follow a shooting, officers may suffer adverse reactions such as sleep interruption, anxiety, and depression.

- Although some officers did not *feel* fear during a shooting, they still sensed imminent danger to themselves or others that met the standard for using deadly force.

- Contrary to earlier research findings, few officers in the study suffered

Table 1. Officers' perceptual distortions during shooting incidents (*n* = 113)

Distortion	At any time	Prior to firing	Upon firing
Tunnel vision	51%	31%	27%
Heightened visual detail	56%	37%	35%
Both visual distortions	15%	10%	11%
Auditory blunting	82%	42%	70%
Auditory acuity	20%	10%	5%
Both aural distortions	9%	0%	9%
Slow motion	56%	43%	40%
Fast motion	23%	12%	17%
Both time distortions	2%	0%	2%
Other	13%	6%	9%
Total	**95%**	**88%**	**94%**

Officers who felt a lack of support from their colleagues and supervisors or that aspects of the investigation into the shooting were unfair or unprofessional reported more severe and longer lasting negative reactions following the shooting, particularly after 3 months.

long-lasting negative effects following a shooting. Officers' postshooting responses were influenced by the attitudes and actions of investigators, colleagues, family members, and friends; these reactions diminished markedly as attention and activity around the incident lessened. (See table 2.)

What Happens in the Months Following a Shooting?

Most officers reported experiencing no negative reactions 3 months after the shooting, and fewer than one in five reported "severe" reactions (two or more negative emotional or physical reactions) 3 months after the shooting. Even in the short term, many officers experienced no or only one negative reaction during the first day and week following a shooting (38 and 52 percent, respectively). Only one specific reaction—recurrent thoughts—persisted past the 3-month mark in more than one-third of the cases, and only two other reactions exceeded 10 percent—fear of legal problems and trouble sleeping, both of which were reported in 11 percent of the cases.

The emotions that officers experienced were not all negative. Following about one-third of the shootings, officers reported feelings of elation that included joy at being alive, residual excitement after a life-threatening situation, and satisfaction or pride in proving their ability to use deadly force appropriately.

Expressions of support from fellow officers, detailed discussions about the incident with officers who had previously shot a suspect, and taking department-mandated time off following the shooting were associated with slight or moderate reductions in officers' negative reactions. Conversely, officers who felt a lack of support from their colleagues and supervisors or that aspects of the investigation into the shooting were unfair or unprofessional reported more severe and longer-lasting negative reactions following the shooting, particularly after 3 months. Less predictably, support from intimate partners or family members

and attendance at mandatory mental health counseling sessions were not associated with officers' postshooting reactions.

What Does This Mean for Police Agencies?

Training. The finding that most officers in this study experienced little long-term disruption as a result of shooting a suspect calls into question the appropriateness of training that stresses the severe guilt and depression felt by some officers who shoot. Focusing on severe responses that occur infrequently may be misleading and counterproductive. Several officers indicated in interviews that they thought something might be wrong with them because they did not experience the symptoms that training taught them to expect; others felt that, through the power of suggestion, their reactions were more severe than they would have been otherwise.

Mental health counseling. Many officers who underwent mandatory postshooting counseling reported that the experience was not positive (although three officers who reported long-term depression found counseling to be helpful). Most officers who held this opinion said they believed their department required counseling to shield itself from legal liability, not to help the officers themselves. They stated that they did not talk frankly to the counselors because they did not trust them to keep the sessions confidential; in some cases, they thought the counselors were incompetent.

Several officers admitted that they lied to counselors about their reactions because they did not want to divulge their thoughts, feelings, and experiences to a stranger with ties to the department. This contrasts with officers' willingness to discuss the shooting with fellow officers who had also been involved in shootings and suggests that peer counseling may be more helpful to these officers than mandatory critical incident debriefings.

Officers may honestly say they cannot recall some aspect of the incident or report information that conflicts with other evidence. Investigators faced with

Table 2. Officers' responses following a shooting

Physical response	At any time (*n* = 113)	First 24 hours (*n* = 112)	First week (*n* = 113)	Within 3 months (*n* = 111)	After 3 months (*n* = 105)
Trouble sleeping	48%	46%	36%	16%	11%
Fatigue	46%	39%	26%	7%	5%
Crying	24%	17%	7%	2%	2%
Appetite loss	17%	16%	8%	2%	1%
Headache	7%	6%	4%	1%	1%
Nausea	4%	4%	4%	0%	0%
Other physical response	19%	18%	11%	12%	6%
Thoughts and feelings					
Recurrent thoughts	83%	82%	74%	52%	37%
Anxiety	40%	37%	28%	13%	10%
Fear of legal or administrative problems	34%	31%	25%	19%	11%
Elation	29%	26%	19%	11%	5%
Sadness	26%	18%	17%	5%	5%
Numbness	20%	18%	7%	4%	3%
Nightmares	18%	13%	13%	10%	6%
Fear for safety	18%	9%	10%	9%	8%
Guilt	12%	10%	5%	6%	2%
Other thoughts or feelings	42%	33%	23%	20%	14%

Note: The different *n* values reflect the timing of the 113 shootings. For example, two of the shootings occurred within 3 weeks before the interview and another six occurred between 2 and 3 months before the interviews. One officer was critically injured and unconscious for 48 hours following her shooting, so questions regarding the first 24 hours after her shooting did not apply to her.

problematic statements from officers can try to fill in the gaps or reconcile conflicting evidence through further investigation.

In addition, because officers may fire at a suspect without realizing it, investigators may want to check the weapons of all officers who were immediately present at a shooting for evidence of firing, even if the officers report that they did not fire.

NCJ 212266

Note

1. See, for example, Stratton, John G., David Parker, and John R. Snibbe, "Posttraumatic Stress: Study of Police Officers Involved in Shootings," *Psychological Reports,* 55 (August 1984): 127–131; Solomon, Roger M., and James H. Horn, "Postshooting Traumatic Reactions: A Pilot Study," *Psychological Services for Law Enforcement Officers,* ed. James T. Reese and Harvey A. Goldstein, Washington, DC: U.S. Government Printing Office, 1986; Campbell, John Henry, "A

Comparative Analysis of the Effects of Postshooting Trauma on the Special Agents of the Federal Bureau of Investigation," unpublished Ph.D. dissertation, Department of Educational Administration, Michigan State University, East Lansing, MI, 1992;

Nielson, Eric, "Salt Lake City Police Department Deadly Force Policy Shooting and Postshooting Reactions," unpublished paper, Salt Lake City, UT: Salt Lake City Police Department, 1981.
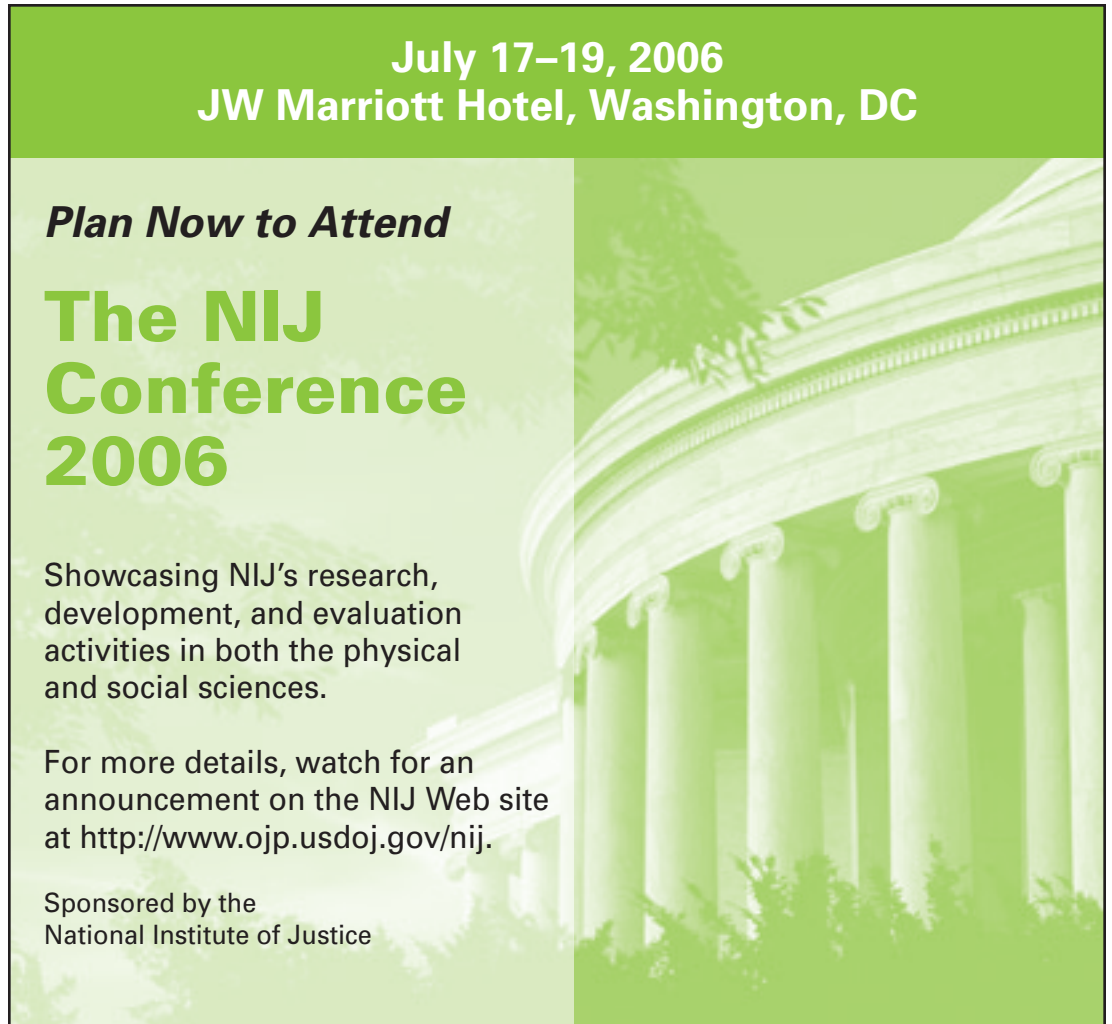
Automated Information Sharing:
Does It Help Law Enforcement Officers Work Better?

Law enforcement must share information within and among agencies. Doing so increases not only public safety, but officer safety as well.

Final report submitted to NIJ, Assessing an Automated Information-Sharing Technology in the Post '9-11' Era: Do Local Law Enforcement Officers Think It Meets Their Needs? *by Martin J. Zaworski, available from NCJRS (NCJ 208757).*

Law enforcement must share information within and among agencies. Doing so increases not only public safety, but officer safety as well. Contributing to better sharing of information is the goal of the Automated Regional Justice Information System (ARJIS), developed as a Web-based network of criminal justice agencies in San Diego County.

This study asked officers and detectives in the San Diego Sheriff's Office (SDSO) their views about ARJIS and information technology in general. Their views were then compared to those of officers in a sheriff's department located in the Southeastern United States that has no automated information-sharing system.

Officers in the SDSO use ARJIS for tactical analysis, crime analysis, and investigations, and to obtain statistical information.[1] They can also ask the system to notify them when information they need about an individual, location, or vehicle is available from another agency or officer. To use ARJIS, they stop at a satellite police station in the communities they patrol. Comparison officers must make phone calls to obtain the same kinds of information.

The two agencies also differ more broadly in their use of information technology. More than three-fourths of SDSO officers use their computers 6 to 8 hours a day, while only 30 percent of officers in the comparison agency use their computers that much. Because officers in the non-ARJIS agency are not allowed to use their computers while driving, the number of hours they can spend online is limited.

Perceptions of IT and Information Sharing

Officers were asked if—in their view—their productivity was increasing because of information technology and information sharing.

SDSO officers felt more strongly than officers in the comparison agency that information technology in general increases effectiveness and job performance. Officers from both agencies think information sharing is important, but there was no difference between the two in how they think it affects their productivity.

There was essentially no difference between the two groups in how they saw the role of information sharing in making arrests. Because SDSO officers have access to regional information and thus would seem to be better equipped to make arrests, this result was unexpected.

Investigations, Arrests, Case Clearances: Perceptions v. Reality

Does ARJIS increase case clearances? SDSO officers were likely to think so. In fact, many of them attributed clearances directly to ARJIS. Even though officers in the comparison agency use computers to obtain information that helps clear cases, without ARJIS they have less immediate access to information that supports case clearances.

Analysis of crime clearance and arrest data produced some unexpected results. ARJIS users believe it helps them in certain tasks like investigating, making arrests, and solving crime. However, in solving violent crimes, both groups had virtually the same success rate. In solving property crimes, the agency without ARJIS did much better, almost tripling the number cleared by SDSO officers. The comparison agency's arrest rate was also much higher.

Officers were observed to focus more on what is happening in their patrol zones, and they attribute that focus to the need to prepare for their agencies' CompStat sessions. Technology itself is never the sole factor affecting performance.

Any number of variables between the SDSO and comparison agency may account for why the SDSO officers made fewer arrests and cleared fewer property crimes. Differences in how arrests and clearances were reported, and other organizational differences may account for this unexpected result. One particular factor is the management philosophy of the comparison agency. The agency uses CompStat as part of its "performance management imperative."[2] Officers in the agency attribute decreased crime and increased clearance rates to CompStat, which sets rigorous performance measures and requires accountability from commanders at the precinct level. Officers were observed to focus more on what is happening in their patrol zones, and they attribute that focus to the need to prepare for their agencies' CompStat sessions. Technology itself is never the sole factor affecting performance.

Improving ARJIS

Law enforcement officers believe that regional information-sharing technology increases their productivity. But the research also suggests that there are opportunities to improve ARJIS and its implementation.

SDSO officers found it more difficult than comparison agency officers to locate data. Information overload can make it difficult for officers to find exactly what they need. When adopting information-sharing technologies, officials could obtain input from street-level officers to ensure that the system delivers no more than what is needed.

Neither agency provides much formal training, and officers from both agencies were dissatisfied with the amount of training offered. Some officers from both agencies said they spend a lot of time training colleagues, indicating that a system of informal, unstructured training has emerged to fill the void. Policymakers might be able to bolster training; formally recognize the existence of informal training; and give trainers additional recognition, status, or rewards.

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For more information

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- For more information about ARJIS, visit http://www.arjis.org.

Notes

1. Electronic interfaces with the 50 participating justice agencies offer access to information about criminal cases, arrest citations, field interviews, traffic accidents, fraudulent documents, photographs, gangs, and stolen property. More than 10,000 users generate more than 35,000 transactions daily.

2. CompStat ("Computerized Statistics") is a management strategy that gives local commanders considerable discretion while requiring accountability for crime in their precincts. In the New York City Police Department, where it was first adopted in 1994, a major part of CompStat is weekly crime control strategy briefings in which the discussions are based on statistical analyses of crime reports.

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