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Expanding the Offender Index of the New York State DNA Data Bank

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INTRODUCTION

Several proposals under consideration in the State legislature would significantly expand the criteria for including offenders' DNA profiles in the Offender Index of the State's DNA Data Bank. Current law requires indexing offenders convicted of certain felonies—mostly violent crimes and selected drug crimes. A bill introduced in the Assembly (A4486) would extend the index to encompass all felony convictions. A bill in the Senate, initiated by the Governor, would include convictions for all Penal Law felonies, as well as class A and B misdemeanors (S5640). Still other proposals (e.g., S4136 and A7678) would base the DNA indexing criteria on arrest rather than conviction, indexing persons *arrested* for all *fingerprintable* offenses (though DNA profiles would subsequently be purged from the Offender Index if the qualifying arrests did not result in criminal convictions). Any of these proposals, if enacted into law, would significantly increase the number of DNA profiles on the Offender Index, adding tens of thousands of persons to the DNA Data Bank each year.¹

The current list of offenses that qualify offenders for indexing on the State DNA Data Bank (see pp. 8-9) is grounded in the conventional wisdom that persons already convicted of violent crimes are the ones likely to commit additional violent or other *forensic DNA offenses*.² However, an extensive body of research on criminal careers suggests that many offenders convicted of offenses not currently indexed—*i.e.*, nonviolent felonies and misdemeanors—are also frequently involved in violent crimes and other offenses likely to yield DNA evidence.³

NOTE FROM THE DIRECTOR

Since January 1, 1996, the law in New York State has required offenders convicted of certain felonies to submit biological samples (formerly blood and more recently buccal samples swabbed from the inside of the cheek) for DNA profiling through laboratory analysis.

The resulting records of offender DNA profiles are organized into a centralized index within the State DNA Data Bank—a part of CODIS, the national Combined DNA Index System developed by the FBI. When matched against samples of forensic DNA gathered from crime scenes, these reference DNA profiles from the Offender Index can identify—or eliminate—suspects in criminal investigations. Forensic DNA analysis has been shown to be a highly efficient technique that assures a greater likelihood of detection than traditional forensic methods.

This DCJS report compares two proposals to expand the State DNA Data Bank by indexing those offenders convicted of nonviolent felonies and less serious crimes as well. It offers policymakers information based on New York State data that can be used to assess the relative potential of these proposals to provide *coverage* for crimes likely to yield DNA evidence. Expanding the Offender Index of the State DNA Data Bank will increase the likelihood that more suspects in violent and other serious crimes where DNA evidence is collected can be identified and brought to justice.

Katherine N. Lapp
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The Issue: Expanding the DNA Index.

If offending patterns among most offenders are "versatile"—as indicated in prior research—then expanding the Offender Index of the DNA Data Bank would increase the likelihood of matching offenders with forensic DNA samples and may help solve more crimes. For optimal coverage in matching to forensic submissions, the Offender Index should contain DNA identification profiles of "active" offenders, that is:

- offenders who are likely to commit *forensic DNA offenses* in the future; and
- offenders who have committed as yet unsolved *forensic DNA offenses* in the past.

A limited increase in the Offender Index will be realized simply by waiting for more offenders who were initially convicted of a nonviolent offense to be convicted of a DNA index offense at a later time. However, established research on criminal offending patterns suggests that expanding the list of index-qualifying offenses to include nonviolent offenses might increase the utility of this identification tool. This frames the fundamental question addressed in this report: *If the Offender Index were to be expanded, which class of offenses should be added to optimize the Data Bank's coverage of forensic DNA offenses?* Because most attention has focused on alternative conviction-based structures, they were chosen as the focus for this study.

The Present Study.

The more "active" offenders there are on the Offender Index, the greater the likelihood of matching one of them with a forensic DNA sample from a crime scene. Determining how best to achieve that objective, though, requires consideration of various factors. This research is intended to offer guidance in that task by providing estimates of *how much* two alternative proposals for expanding the Offender Index might enhance the potential utility of the DNA Data Bank.

The existing Offender Index itself is too new and

too restricted in scope to provide the necessary data to conduct this assessment. Since the Index contains information only on offenders who have already qualified under existing law, it is not possible to measure directly what the consequences would be of including persons convicted of crimes that currently do not qualify.⁴ Instead, this study fashioned an indirect assessment to model expansion of the Index using adult criminal history data from a cohort of *all New York State residents born in 1969*. Offender criminal histories were examined for arrests for Violent Felony Offenses (VFOs) from ages 16 through 30, the most crime-prone period of life. VFO arrests were used as proxies for *forensic DNA offenses*—crimes likely to yield forensic DNA evidence. On this basis, the existing index was compared to two expansion proposals: an index based on conviction for *all felonies*, including Youthful Offender (YO) adjudications substituted for felony convictions (A4486), and one based on conviction for *all crimes*—felonies and misdemeanors—including felony and misdemeanor YO adjudications (S5640).

The study investigated the following specific questions:

- Specialization/Versatility: Do certain offenders tend to specialize in *forensic DNA offenses* (as measured by VFO arrests)? Or, do offenders who commit these offenses also tend to commit a variety of other types of crimes? (If the latter, then a person indexed for a nonviolent offense could well be one who is also likely to commit VFOs at other times.) For the versatility analysis, offenders in the study cohort were assigned to one of three mutually exclusive "offender groups," based on whether their *first* adult conviction was for an offense covered under the *Existing Index*, for a *Non-Index Felony*, or for a *Misdemeanor*.
- Coverage of VFO Offenses: To what extent do different qualifying criteria for the Offender Index affect the potential of the index to "cover" VFO offenses committed in the cohort? *Coverage*, in the study, is measured as *the percentage of the total number*

of VFO arrests in the overall 1969 birth cohort attributable to offenders subject to indexing under a given set of criteria. A comparison of coverage levels across the different index models allows for an assessment of the relative utility of each index. Analyses of coverage were based on assignment of offenders to three, nonexclusive “index groups”—representing offenders included under the *Existing Index*, an *All-Felony Index*, and an *All-Crime Index*—according to whether they were ever convicted of a qualifying offense.

It should be noted that the study used arrests as an indirect measure of VFO crimes, since crimes themselves could not be measured directly. Similarly, VFOs were a proxy for any crime that yields forensic DNA evidence. Coverage rates were calculated in terms of VFO arrests of cohort members between the ages of 16 and 30. As a result, coverage rates for the cohort cannot be compared directly with *annual* forensic-to-offender DNA hit rates involving new crimes with no known suspects.⁵

FINDINGS

All three offender groups showed substantial versatility in offending.

Versatility in offending was assessed by assigning offenders to groups based on the crime type of their first adult conviction, then examining their criminal histories for VFOs. VFO arrests that resulted in the qualifying convictions were excluded. Offenses that qualified offenders for the offender groups included: the existing list of selected felonies—primarily VFOs (Existing Index group); the remaining felonies not on the existing list, including felony YO adjudications (Non-Index Felony group); and Class A or B misdemeanors, including misdemeanor YO adjudications (Misdemeanor group).

The following chart shows the percentage of offenders in each offender group who were arrested for one or more VFOs, *excluding the arrest underlying the indexing conviction*. The

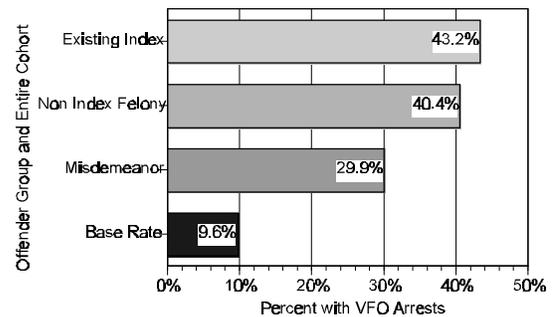


Fig. 1. Percent of Offenders Committing VFOs from Ages 16 through 30, by Offender Group and for Cohort.

base rate shows the percent of persons in the entire cohort who had *any* VFO arrests.

Over 40 percent of the offenders assigned to the Existing Index group were arrested for one or more VFOs as young adults (exclusive of VFO arrests underlying the indexing convictions). This compares with 40 percent of the Non-Index Felony group and 30 percent of the Misdemeanor group. Less than 10 percent of State residents born in 1969 were arrested from ages 16 through 30 for crimes involving VFOs. (See Fig 1.)

Similar patterns were found in separate analyses (not presented here) of young adult arrests for homicide, sex offenses, robbery, assault, and burglary.

In sum, this analysis demonstrated that substantial proportions of all three offender groups were involved as young adults in crimes that have a realistic potential to yield forensic DNA evidence. Thus, the crime type of a single criminal conviction does not distinguish very well between offenders who are likely to be committing forensic DNA offenses and those who are not. This raises concerns about how well the Existing Index “covers” the forensic DNA offenses of the cohort. The coverage of the Offender Index is addressed in the following section of the report.

DNA profiling of convicted offenders who are not currently indexed will substantially increase coverage, especially for VFO offenses committed after an offender is indexed.

The preceding analysis focused on the percentage of persons in each offender group arrested for one or more VFOs between their sixteenth and thirtieth birthdays. This section focuses on the percentage of VFOs committed by the cohort that would be covered under the various indexing scenarios. Coverage, in this study, is the proportion of VFOs committed by the cohort that are attributable to indexed offenders.

Expanding the Offender Index increases coverage in two ways: 1) offenders are added to the index who would not be there otherwise; and 2) “active” offenders are indexed earlier in their careers. To analyze how expanding the Offender Index affects coverage, offenders in the cohort were assigned to an index group if they were ever convicted, from ages 16 through 30, of a qualifying offense for a given index. This produced three types of index groups—the Existing Index, an All-Felony Index, and an All-Crime Index. The three index groups are cumulative, that is, each expansion subsumes all offenders that qualified for the more restrictive index group.

The initial analysis examined the overall coverage provided by each index. Overall coverage is the percent of all VFOs in the cohort attributed to indexed offenders over the entire young adult offending career. Following that, a more detailed analysis compares the relative ability of each index to provide coverage for VFOs committed after the qualifying conviction that results in indexing the offender on the DNA Data Bank.

Overall Coverage: The chart below shows, for each index type, the overall percentage of VFOs covered, together with the percentage of persons in the cohort who would be indexed by having ever been convicted of a qualifying offense as a young adult.

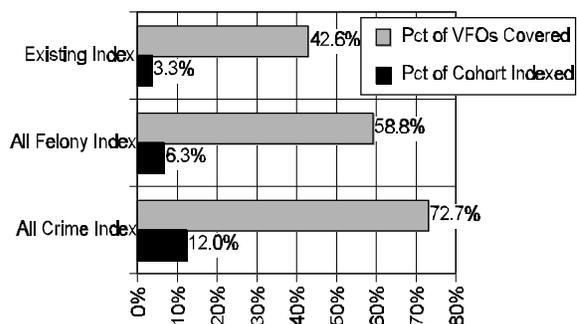


Fig. 2. Percent of VFOs Covered Overall and Percent of Cohort Indexed by Index Type.

The following highlights the comparison in overall coverage between the Existing Index and each expansion proposal:

- Ⓒ Compared to the Existing Index, the All-Felony Index added an extra 16.2% in overall coverage, increasing it from 42.6% to 58.8% of all VFO offenses committed by the cohort, while increasing the number of persons indexed from 3.3% to 6.3% of the cohort.
- Ⓒ Compared to the Existing Index, the All-Crime Index added an extra 30.1% in overall coverage, increasing it from 42.6% to 72.7% of all VFO arrests in the cohort, while increasing the number of persons indexed from 3.3% to 12.0% of the cohort.

As expected, overall VFO coverage increased substantially, from 42.6% to 72.7%, as the index was expanded to include more offenders, representing a greater proportion of the cohort indexed, from 3.3% to 12.0%. However, the full benefit of expanded indexing is even greater because, as shown below, expanded indexing also identifies offenders earlier in their violent criminal careers.

Coverage After Indexing:

The coverage provided by each index is comprised of VFOs that occurred (1) before arrest for the indexing crime, (2) at the time of arrest for the indexing crime, and (3) subsequent to arrest for the indexing crime. Clearly, it is most desirable to have offenders indexed before the onset of violent offending. Although post-offending indexing may help to solve previously unsolved crimes, it may not help law enforcement to identify offenders early and intercede in violent criminality.

The following analysis examines coverage in relation to *when* offenders are indexed. To the extent offender indexing occurs earlier in the offending career, we should expect to see a greater percentage of VFO coverage occurring after offenders are indexed.

Table 1 shows the total percentage of VFOs in the cohort covered by each index type, the percentage of the VFOs covered by each index that occurred *after* the offenders would have been indexed, and the resulting post-indexing coverage as a percentage of all VFOs in the cohort.

Table 1: Coverage of VFOs Occurring After Indexing

Index	Total Pct of Cohort VFOs Covered (a)	Pct of Covered VFOs Occurring After Indexing (b)	Pct of Cohort VFOs Covered After Indexing (a x b)
Existing	42.6%	28.7%	12.3%
All-Felony	58.8%	41.9%	24.7%
All-Crime	72.7%	54.8%	39.8%

Of the two expansion proposals, the All-Crime Index clearly demonstrated the greater gain in post-indexing coverage—the type likely to be of greater use in solving new crimes. More than half of the VFO arrests of offenders in the All-Crime group occurred subsequent to the time at which they would have been indexed if an All-Crime Index had been in place in New York

State. The other two indexing structures clearly identify violent offenders later in their criminal careers.

The combined result of adding more offenders to the index and indexing many offenders earlier in their careers was that the All-Crime Index more than tripled post-indexing coverage—from 12.3% to 39.8%—covering about four in ten of all VFO arrests in the cohort.

Discussion: Expanding the Existing Index would mean that offenders enter the DNA Data Bank earlier in their criminal careers and in significantly greater numbers. Indexing offenders earlier in their careers enhances prospects for earlier and more substantial criminal justice interventions. Earlier imposition of appropriate sanctions could help reduce the opportunity to commit future crimes, especially during the most crime-prone years. Thus, in addition to solving more crimes, crime prevention is an indirect but tangible benefit of an expanded Offender Index that maximizes coverage by indexing offenders early in their criminal careers.

CONCLUSIONS

From this analysis of a New York State birth cohort, the DCJS study confirmed the findings of other research in concluding that violent criminals tend to be quite versatile in their patterns of offending. It also demonstrated that expanding the Offender Index by extending the list of qualifying offenses would substantially increase the coverage of the DNA Data Bank—*i.e.*, the possibility of matching indexed offenders with the kinds of crimes expected to yield forensic DNA evidence. Expanded coverage increases the likelihood of detecting criminal offending through the use of DNA evidence recovered at crime scenes.



CAUTIONS

The following questions and answers provide important information about—and qualifications to—this study.

Why study a birth cohort?

Tracking the same group of individuals over time was necessary in order to assess individual offending patterns—rates of participation in crime, frequency of offending and the degree of offense specialization. This study focused on a group of individuals born in the same year, that is, a "birth cohort." Members of a birth cohort enter and exit their crime-prone years together, and all experience the general effects of external events together—events such as changes in the law or law enforcement practices, for example.

Focusing the analysis on a birth cohort permits comparisons among subgroups within the cohort (different offender index groups, in this case) while controlling for a wide range of external influences. Subgroup comparisons also were made more meaningful by contrasting them against a "base rate" for all New York State residents born in the same year. A comparison of offending patterns across index offender groups within the cohort was key to evaluating the potential implications of proposed expansions to the Data Bank.

The study uses a statistical, rather than actual, birth cohort in all calculations of rates involving the cohort. The numerator in each rate is based on persons born in 1969 who had a record of arrest on the DCJS Computerized Criminal History (CCH) data base. The denominator is the average number of persons in the New York State population from 1986 through 2000 whose birth year was 1969.

Does this study attempt to assess the effectiveness of DNA Data Bank operations?

No, it does not. Generally, such measures compare snapshots of operations over particular periods—a month, a quarter, a fiscal or calendar year. Also, operational studies would have to assess such factors as the effectiveness of local agencies in obtaining, preserving and transmitting forensic evidence from crime scenes or the efficiency of laboratories in matching these with Offender Index profiles. The present study instead aims at long-term policy questions centering on the relative impact of different Offender Index qualifying criteria on the potential for solving crimes in which forensic DNA evidence is likely to be obtained.

Without information on operational practices, it is not possible to determine specific "hit rates" under different index structures. However, at a given level of efficiency, hit rates could be expected to increase in proportion to the increases in coverage found in this study, simply as a function of the greater likelihood of matches under expanded Data Bank indexes.

What are the policy implications of the study?

Of the many factors that can affect the utility of CODIS in solving crime—*Who is indexed for what offenses? What crimes are analyzed for forensic DNA in the field? What operational procedures and techniques are applied?*—this study focused primarily on the first, specifically, how different index structures affected "coverage" of crimes likely to yield forensic DNA evidence. Coverage in this sense refers to the *maximum potential* of CODIS to generate matches based on the anticipated crime patterns of offenders indexed in the Data Bank.

How reasonable is the use of VFO arrests as a proxy for crimes that yield forensic DNA evidence?

Of course, the ultimate goal of the study is to assess the effect of different index structures on covering crimes likely to yield forensic DNA evidence, not crimes for which an offender has already been arrested. Arrests were used as a proxy because it is impossible to link unsolved crimes to known offenders. Research on self-reported offending shows that the probability of arrest is higher among offenders who have high rates of offending; groups with relatively higher offending rates have relatively higher arrest rates. In general arrest is accepted as a conservative estimator of the actual number of crimes committed.

VFO offenses generally have a high likelihood of physical contact between offender and victim or other circumstances that would lead to personal physical evidence being available at a crime scene. This study's focus on VFOs does not rule out the forensic DNA potential of non-VFO offenses, like auto theft, where the collection of DNA evidence also appears promising.

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New York State DNA Data Bank Qualifying Offenses

Note: Offenses listed in bold are also Violent Felony Offenses as defined in Penal Law § 70.02

Persons convicted of - and sentenced - for any one of the following offenses committed on or after the effective date of the DNA Law (December 1, 1999), as well as persons convicted and sentenced prior to December 1, 1999 whose sentences had not been completed by December 1, 1999, are required to provide a sample appropriate for DNA testing to be included in the State DNA Identification Index:

Penal Law Statute	Offense
120.05	Assault in the second degree
120.06	Gang assault in the second degree
110.00/120.06	Attempted gang assault in the second degree
120.07	Gang assault in the first degree
110.00/120.07	Attempted gang assault in the first degree
120.08	Assault on a peace officer, police officer, fireman or EMS professional
110.00/120.08	Attempted assault on a peace officer, police officer, fireman or EMS professional
120.10	Assault in the first degree
110.00/120.10	Attempted assault in the first degree
120.11	Aggravated assault upon a police officer or a peace officer
110.00/120.11	Attempted aggravated assault upon a police officer or a peace officer
120.60 (1)	Stalking in the first degree
125.15	Manslaughter in the second degree
125.20	Manslaughter in the first degree
110.00/125.20	Attempted manslaughter in the first degree
125.25	Murder in the second degree
110.00/125.25	Attempted murder in the second degree
125.27	Murder in the first degree
110.00/125.27	Attempted murder in the first degree
130.25	Rape in the third degree
130.30	Rape in the second degree
130.35	Rape in the first degree
110.00/130.35	Attempted rape in the first degree
130.40	Sodomy in the third degree
130.45	Sodomy in the second degree
130.50	Sodomy in the first degree
110.00/130.50	Attempted sodomy in the first degree
130.65	Sexual abuse in the first degree
130.66	Aggravated sexual abuse in the third degree
130.67	Aggravated sexual abuse in the second degree
110.00/130.67	Attempted aggravated sexual abuse in the second degree
130.70	Aggravated sexual abuse in the first degree
110.00/130.70	Attempted aggravated sexual abuse in the first degree
130.75	Course of sexual conduct against a child in the first degree
110.00/130.75	Attempted course of sexual conduct against a child in the first degree
130.80	Course of sexual conduct against a child in the second degree
135.20	Kidnaping in the second degree
110.00/135.20	Attempted kidnaping in the second degree
135.25	Kidnaping in the first degree
110.00/135.25	Attempted kidnaping in the first degree
140.20	Burglary in the third degree
110.00/140.20	Attempted burglary in the third degree

140.25	Burglary in the second degree
110.00/140.25	Attempted burglary in the second degree
140.30	Burglary in the first degree
110.00/140.30	Attempted burglary in the first degree
150.15	Arson in the second degree
110.00/150.15	Attempted Arson in the second degree
150.20	Arson in the first degree
110.00/150.20	Attempted arson in the first degree
155.30 (05)	Grand larceny in the fourth degree
160.10	Robbery in the second degree
110.00/160.10	Attempted robbery in the second degree
160.15	Robbery in the first degree
110.00/160.15	Attempted robbery in the first degree
215.16	Intimidating a victim or witness in the second degree
215.17	Intimidating a victim or witness in the first degree
110.00/215.17	Attempted intimidating a victim or witness in the first degree
255.25	Incest
265.02 (04, 05, 06)	Criminal possession of a weapon in the third degree
110.00/265.02 (04, 05, 06)	Attempted criminal possession of a weapon in the third degree
265.03	Criminal possession of a weapon in the second degree
110.00/265.03	Attempted criminal possession of a weapon in the second degree
265.04	Criminal possession of a dangerous weapon in the first degree
110.00/265.04	Attempted criminal possession of a dangerous weapon in the first degree
265.08	Criminal use of a firearm in the second degree
110.00/265.08	Attempted criminal use of a firearm in the second degree
265.09	Criminal use of a firearm in the first degree
110.00/265.09	Attempted criminal use of a firearm in the first degree
265.12	Criminal sale of a firearm in the second degree
110.00/265.12	Attempted criminal sale of a firearm in the second degree
265.13	Criminal sale of a firearm in the first degree
110.00/265.13	Attempted criminal sale of a firearm in the first degree
265.14	Criminal sale of a firearm with the aid of a minor
110.00/265.14	Attempted criminal sale of a firearm with the aid of a minor
<i>A sample appropriate for DNA testing must also be provided by a person convicted of any of the following offenses relating to escape and absconding -- but only where the offender has been convicted within the past five years of one of the felonies listed previously:</i>	
205.10	Escape in the second degree
205.15	Escape in the first degree
205.17	Absconding from temporary release in the first degree
205.19	Absconding from a community treatment facility
<i>A sample appropriate for DNA testing must also be provided by a person convicted of and sentenced for any of the following offenses on or after December 1, 1999:</i>	
155.30 (05)	Grand larceny in the fourth degree
220.18	Criminal possession of a controlled substance in the second degree
220.21	Criminal possession of a controlled substance in the first degree
220.31	Criminal sale of a controlled substance in the fifth degree
220.34	Criminal sale of a controlled substance in the fourth degree
220.39	Criminal sale of a controlled substance in the third degree
220.41	Criminal sale of a controlled substance in the second degree
220.43	Criminal sale of a controlled substance in the first degree
220.44	Criminal sale of a controlled substance in or near school grounds
Source: http://criminaljustice.state.ny.us/forensic/dnaofftb.htm	

ENDNOTES

1. In New York State during calendar year 2000, 10,653 persons—representing 8% of all criminal convictions that year—received their first qualifying conviction for the existing Offender Index. By comparison, 22,450 persons—16.8% of all criminal convictions—were convicted for the first time on *any felony*; and 48,324 persons—36.2% of all criminal convictions—were convicted for the first time on *any felony or misdemeanor*.

2. The term *forensic DNA offenses*, as used in this report, refers to those offenses likely to yield DNA evidence from the processing of a crime scene in the course of a criminal investigation. Most often these are violent offenses characterized by significant contact between victim and offender. However, other crimes, such as burglary or auto theft, are also increasingly found to yield DNA evidence as well.

3. Whether or not offenders specialize in particular crimes or crime types has significant implication for the efficacy of the State's DNA Offender Index. A general propensity for offenders to "repeat the same specific offense or offense type on successive criminal events" (Paternoster, *et al.*, 1998: 133) would limit the need to expand the current list of DNA index qualifying offenses. Conversely, it would seem reasonable to expand the range of qualifying offenses if most offenders tended to commit a variety of offenses over the course of their criminal careers.

The most consistent finding to emerge from the research literature on offense specialization supports the view that offending patterns for the overwhelming majority of adult offenders are characterized by diversification, supplemented by a limited degree of specialization within broad types of offenses (Mulvihill and Tumin, 1969; Miller, Dinitz and Conrad, 1982; Chaiken and Chaiken, 1982; Blumstein, Roth and Visser, eds. 1986; Blumstein, Cohen, and Moitra, 1988).

A modest degree of offense specialization within broad categories of property and drug crime types—but not violent crime—has been found particularly among offenders with extensive criminal histories involving several serious offenses (Blumstein, Cohen, and Moitra, 1988). Crime switching was more likely to occur within broad crime types than between them, but between-type transitions, such as violent to property and vice versa, were not altogether uncommon (Chaiken and Chaiken, 1982). Specialists—that is offenders who commit one crime at a high rate—only ranged from 1 percent (Simon, 1994) to 10 percent (Peterson and Braiker, 1980).

On the other hand, versatility—offending patterns that span a wide variety of crime types—was common in the criminal careers of most adult offenders (Gottfredson and Hirschi, 1990; Peterson and Braiker, 1980; and Reiss and Roth, eds., 1993). In a 20-year followup study of serious offenders who began their criminal careers early in life, virtually all (94 percent) had committed minor crimes (Haapanen, 1998). A review of the National Research Council's study of violence suggests that arrests for violent crimes "appear to be embedded in long careers dominated by arrests for nonviolent crimes" (Simon, 1997: 37). Other research asserts that a useful distinction between violent and property offenders on the basis of their criminal careers has not been established. (Chaiken and Chaiken, 1982; Gottfredson and Hirschi, 1990; Reiss and Roth, eds., 1993).

4. The existing Offender Index was analyzed in a companion study to this report which examined the initial 100 hits—forensic-to-offender matches—on the DNA Data Bank. See Gilmer and van Alstyne (2002).

5. To calculate potential hit rates from this information would require a complex simulation model and a series of assumptions about the relationship between group-level crime rates and group-level arrest rates, the comparability of successive birth cohorts, the stability of clearance rates across years, the length of time a given set of indexing criteria has been in effect, and so on. However, the coverage achievable for *Violent Felony Offenses* committed by 16- to 30-year-olds in a single year will be roughly *proportional* to the coverage of *VFO arrests* of 16- to 30-year-olds in a birth cohort to the extent the following conditions are satisfied:

- C The index has been in effect for at least 15 years;
- C Successive birth cohorts are identical with respect to composition and offending patterns;
- C The higher the VFO crime rate in a particular group, the higher the VFO arrest rate for the group;
- C The ratio of VFO arrests to VFOs known to the police does not change; and
- C The ratio of VFO arrests to VFOs known to the police is the same within each subgroup of convicted offenders considered. [*Note: it is reasonable to infer from prior research in which both official criminal histories and self-reported crimes have been examined for the same offenders that this assumption holds approximately, at least for violent offenses.*]

In order for the coverage calculations presented here to be considered indicative of potential *absolute* hit rates, it would also be necessary to assume that the ratio of arrests to crimes is the same for offenders who have never been convicted as it is for offenders who have been convicted and are subject to one of the proposed indexes. There is no direct evidence bearing on this assumption, but it seems implausible. It would be invalid, for example, if convicted offenders face a higher probability of arrest given they have committed new crimes than offenders who have not previously been convicted, or if for any other reason a disproportionate number of violent crimes are attributable to persons who have never been caught.

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