MEASURING THE USE
OF CONFINEMENT

Final Report
Grant #80-IJ-CX-0082

93691

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BY

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Final Report, Grant Number 80-IJ-CX-0082

Submitted to

Corrections Division, National Institute of Justice

January 1983

Production of this report was supported under Grant No. 80-IJ-CX-0082, awarded to the National Council on Crime and Delinquency, Fort Lee, N.J. by the Corrections Division, National Institute of Justice, U.S. Department of Justice. The project was directed for NCCD by James Garofalo and monitored for NIJ by Lawrence A. Greenfeld. Points of view or opinions expressed in this report are those of the author and do not necessarily represent the official positions or policies of the U.S. Department of Justice.

ABSTRACT

Although this monograph begins with a conceptualization of confinement that includes all institutions in which the state holds people under lock and key, attention is focused on confinement facilities of the justice system -- prisons, jails, juvenile facilities -- and many of the examples presented pertain only to prisons because of limited data availability.

Two major types of measurement are discussed: the fraction confined and the chance of confinement. Fraction measures reflect the proportion of a base population confined at a given point in time; chance measures reflect the probability of entering confinement during a given time period, given membership in a specified base population. The numerators and denominators of fraction and chance measures are discussed extensively in Chapters II, III, and IV.

In Chapter V, two additional forms of measurement are discussed: time served in confinement and the prevalence of confinement experiences among population cohorts. In the first part of Chapter VI, some implications of measurement issues for policy analysis are discussed.

Because a major purpose of the monograph is to illustrate how measurement can be improved by researchers and analysts with modest resources, the examples presented rely almost exclusively on easily available information from state and federal publications. For the same reason, Chapter VI concludes with some comments and suggestions about improving existing data sets.

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CHAPTER I

INTRODUCTION TO CONCEPTS AND TERMINOLOGY

Since the 19th century, confinement has epitomized the response of the criminal justice system to convicted offenders. This does not mean that confinement is the modal response; probation and other dispositions are more common, especially for the more frequent, minor offenses. But all other sanctions can be viewed in terms of a standard based on confinement. For example, probation is given for cases thought not to be serious enough to warrant confinement, and the death penalty is reserved for cases in which even a long prison term is thought to be insufficient (for whatever reason). Confinement provides the point of departure for both sides of the punishment debate: Advocates of "toughness" argue for more frequent use of confinement and longer sentences, while critics propose alternatives to confinement.

Criminal justice research has used various aspects of confinement as independent variables: the length of time served, the nature of the prison experience, the treatment or custody orientations of institutions, the probability of being sentenced to prison or jail, and so forth. These factors have been examined in relationship to dependent variables such as recidivism, "prisonization," and crime rates.

The use of confinement has also appeared as a dependent variable. This is apparent in historical research which has examined the origins of the prison system and how the use of confinement, vis-a-vis other penalties, has changed over time. There is also a growing body of research concerned with the issue of whether confinement is meted out disproportionately to specific racial groups and social classes. Finally, there have been some examinations of the relationships between the use of confinement and other sociodemographic factors, such as the unemployment rate.

This monograph examines issues relating to how we measure the extent to which a jurisdiction uses confinement; the focus is on the problems of making comparisons of the use of confinement across time and across jurisdictions. Occasionally we will discuss measurement issues as they relate to confinement in institutions that are not associated with the criminal justice system, but most of our attention is given to prisons, jails, and facilities for juvenile delinquents.

In this chapter, commonly used indicators are discussed and criticized. Then, a set of concepts, with accompanying terminology, is presented and explained. In subsequent chapters, the concepts are examined in more detail and are illustrated with data from national and state sources.

The Traditional "Rate of Imprisonment"

The "rate of imprisonment" is a concept that appears frequently in the professional literature. The indicator generally used

for this concept is (POP1/POP2) x k, where POP1 is the number of people held in prison on a given day (or, less frequently, the number of people admitted to prison during a given year), POP2 is the total resident population of the jurisdiction, and k is a constant (usually 100,000). A number of objections can be raised to this traditional indicator.

Regardless of whether the rate is computed with the number of prisoners present or the number of admissions in the numerator, determining the appropriate people to be included in the numerator presents problems, especially when comparisons are being made across jurisdictions. For example, it is not sufficient to compute the "rate of imprisonment" in the United States with a numerator consisting of the number of inmates in state and federal prisons on a given date and then to compare that rate with the "rate of imprisonment" in countries such as Sweden or Denmark. The "prison" statistics in many European countries include inmates who are more comparable to people held in American jails (those serving short sentences or awaiting trial), and there are major cross-national differences in how juveniles are defined and handled (see Waller and Chan, 1974; Doleschal, 1977).

Even within the United States, the problem of the comparability of numerators across jurisdictions occurs. If jail inmates are not included in the numerators, comparisons can be misleading because some states allow sentences of 18-24 months (and even more)

to be served in local facilities, while others require that sentences of more than 90 or 180 days be served in state facilities. Similarly, if the inmates of juvenile institutions are not included in the numerators, comparisons across states can be affected by variations in the jurisdictional age limit of the juvenile court and in the practice of waiving juveniles to adult courts. Perhaps the thorniest question concerns differences in the stringency of custody: Should the inmates in a state with a large proportion of its prisoners serving time in minimum-security community correctional centers be counted the same way as the inmates in a state with virtually all of its prisoners in maximum-security institutions?

The composition of the denominator in the traditional "rate of imprisonment" -- the total resident population of the jurisdiction -- has also been questioned (e.g., Waller and Chan, 1977; Fla. Dept. of Corrections, 1980). Some subgroups of the population -- the very young, the elderly, women -- have relatively low probabilities of being in prison, while males between the ages of 19 and 35 are overrepresented, compared to their numbers in the general population. Part of the variation in "rates of imprisonment" could be due to differences in population age and sex distributions among jurisdictions or changes in the distribution over time. Another criticism is that the denominator counts the resident population of the jurisdiction, while the numerator includes some proportion of inmates who are not residents; to the extent that this proportion

varies among jurisdictions or over time, comparisons of "rates of imprisonment" can be affected.

The preceding criticisms of the traditional "rate of imprisonment" deal with questions of measurement. But technical measurement problems do not exhaust the topic. Even when well measured, the "rate of imprisonment" does not subsume all of the conceptual issues involved in variation (across jurisdictions) or changes (over time) in the use of confinement as a sanction. We will be exploring many of those issues empirically in subsequent chapters, but first there is a need to discuss and define some basic terminology.

Proposed Concepts and Terminology

Levels of Inclusiveness

Most of this monograph deals with measurement issues pertaining to two broad concepts: the fraction confined, which refers to the proportion of a specified base population that is confined on a given day, and the chance of confinement, which refers to the probability of being admitted to a confinement facility, given that one occupies a specified status (e.g., a member of the resident population, an arrestee). But before discussing the concepts of fraction and chance, it will be useful to make some differentiations within the concept of confinement.

Confinement is a broad term that can apply to a number of different types of facilities. For our purposes, it will be helpful to be more specific about the range of confinement facilities that

are the subject of any given fraction or chance measure. Accordingly, we use three terms to indicate whether we are referring to a narrow or wide range of confinement facilities at any given time.

At the most inclusive level, we refer to institutions because, for some research purposes, it may be necessary to consider all of the facilities in which the state holds people under lock and key. Focusing only on certain types of institutions could mask the shifting of "clients" from one type of institution to another. For example, Lerman (1981) has shown how the age distributions and the diagnoses of populations in mental health facilities have changed during the movement to remove adults from mental institutions and juveniles from correctional facilities. Similarly, a major concern in many jurisdictions today is that a large number of adult mental patients who have been the beneficiaries of "deinstitutionalization" are ending up in county jails. The rise and decline of special facilities to which mentally disordered offenders and narcotic addicts are civilly committed is another case in point. Thus, the general concept of institutionalization may be necessary in research that tries to address variations in the overall use of confinement as a social control measure. The numerator used to compute the fraction institutionalized (or the chance of institutionalization) ideally includes all people in (or admitted to) residential social control facilities.

At a less inclusive level, we refer to the fraction incarcerated (or the chance of incarceration). The numerator in this case

includes people in all confinement facilities operated by the justice system: prisons, jails, and juvenile correctional and detention facilities.

Finally, at the least inclusive level, we refer to the fraction in prison (or the chance of imprisonment). With this concept, attention is focused on people who have been convicted of crimes and who are serving substantial sentences in confinement facilities -- the image generally associated with the term, "prison."

By necessity, this differentiation among concepts is primarily heuristic. Often, the data needed to construct the most appropriate indicators of the concepts are unavailable, or are available in forms that make them difficult to use. For example, an inclusive indicator of the chance of incarceration would require not only counts of people admitted to prisons, which are widely available, but also counts of people admitted to jails and juvenile facilities, which are more difficult to assemble.

However, by recognizing that (at least) three levels of inclusiveness -- institutionalization, incarceration, imprisonment -- are implied within the general idea of the use of confinement, researchers should be more careful about specifying the exact concepts that they are using. And there is a great deal of room for specifying or modifying the definitions presented to meet the exact needs of a particular research project. The definitions leave some questions open. For example: In which category should confined juvenile status offenders be counted? How long is a

"substantial" sentence for the purpose of constructing an indicator of the fraction in prison or the chance of imprisonment? Also, there is nothing to preclude the addition of other conditions to the definitions. For example, a researcher studying the chance of incarceration might want to focus on adults only or might want to exclude admissions to jails and detention centers that result in stays of less than 24 hours.

Our search for common, working definitions is guided by the hope that, in further specifying or modifying the definitions, researchers will be led to explain explicit rationales for the specifications/modifications in terms of the goals of their research projects. In addition, more careful attention to the exact nature of the facilities and inmates covered by terms such as imprisonment and incarceration should make it more likely that the use of inappropriate indicators and the making of inappropriate comparisons among indicators will be detected. Presumably, this will increase the understanding among researchers of each other's concepts and findings.

Denominators of Fraction and Chance Measures

In the earlier discussion of the traditional "rate of imprisonment" it was noted that the denominator of that rate -- the total resident population of the jurisdiction -- has been the subject of criticisms. Our definitions of three levels of inclusiveness among indicators of the use of confinement (institutionalization, incarceration, imprisonment) do not specify a preferred

denominator to be used in computing a particular chance or fraction measure.

Later, we will have more to say about selecting appropriate denominators. For now, it is sufficient to note that, primarily, we will use the term, base populations, to refer to the denominators of our chance and fraction measures. This term is more neutral than populations at risk, which implies that the defining characteristics of the population are related to variations in the use of confinement and that the person using the term has some notion of the mechanism involved in that relationship.

Relationship Between Fraction and Chance Measures

In this section we discuss the underlying connections and differences between the concepts, fraction in prison and chance of imprisonment. We restrict our attention to prison/imprisonment (rather than including institutionalized/institutionalization and incarcerated/incarceration) because it will simplify the discussion and because fraction in prison/chance of imprisonment have more often been the focus of prior criminal justice research. This approach is not meant to minimize the importance of the distinctions in the three levels of inclusiveness that we have defined. The discussion that follows can, with slight modifications, be applied to the two more general levels, but in the interest of efficient communication, we focus on just one of the levels.

As noted earlier, the fraction in prison refers to the ratio of the number of persons confined in prison at a given time to the

number of persons in a specified base population. The traditional "rate of imprisonment" is one such measure: the number of inmates in the custody of (or under the jurisdiction of) the state prison system on Dec. 31 of a certain year divided by the resident population of that state for that year. In contrast, the chance of prisonment is the probability of entering prison, given that one is in a specified base population. Actually, the chance of imprisonment is most usefully viewed as a series of conditional probabilities, a notion that is discussed fully in Chapter IV of this monograph.

The factor that links the chance of imprisonment to the fraction in prison is the amount of time served in prison (which, of course is determined by the sentence length and release practices, and to some extent, by the mortality rate of prisoners). In fact, the fraction in prison is determined by the amount of time served by inmates who were admitted during previous time periods, extending back to the earliest time at which any currently present inmate was admitted. Thus, two jurisdictions could be characterized by the same chance of imprisonment over a number of years but have very different fractions in prison (or vice-versa) if they differ substantially in the average time served by inmates. Apparantly this is part of the reason why countries such as Denmark and Sweden have fractions in prison (actually, fractions incarcerated) that are so much lower than the United States -- the average time served in those countries is substantially less than in the United States (see Doleschal, 1977).

Care must be exercised in selecting the concept -- fraction vs. chance -- to be used in a research project, because the measures of these concepts have different characteristics. For example, the type-of-crime distribution among inmates in prison on a specific date will differ from the comparable distribution among inmates admitted during a given year because time served varies according to offense. In one state, on the last day of fiscal year 1980, about 42 percent of the male inmates present had been convicted of homicide, sexual assault, or robbery. But among male inmates admitted to prison during fiscal year 1980, a much smaller proportion (24 percent) had been convicted of those crimes. The age distributions of prisoners present and prisoners admitted also differ because those present in prison on a given day comprise a subgroup of earlier admittees who have aged during their time served. In the same state described above, 58 percent of the male inmates admitted during fiscal year 1980 were 25 years old or less, while 40 percent of those present at the end of the fiscal year were in this age group.

The choice of concepts is particularly crucial in trying to understand what factors are associated with variations in the use of imprisonment. As noted, the fraction in prison is determined by admissions and time served -- by factors that extend back in time and cumulate forward for a number of years. Despite this, several research efforts have looked for correlations between the fraction in prison and factors, such as unemployment and crime rates, pertaining to the same year as the fraction (e.g., Garofalo,

1980; Nagel, 1977; Waldron and Pospichal, 1979). The chance of imprisonment is a more appropriate measure to use in such analyses (e.g., Greenberg, 1977). On the other hand, the fraction in prison -- which is a function of the chance of imprisonment and time served -- is suitable for examining overall trends in a jurisdiction's punishment practices, and it has been so used by Blumstein and his colleagues (e.g., Blumstein, Cohen and Nagin, 1977; Blumstein and Moitra, 1979).

Our task in this monograph is to explore measurement issues, not to examine appropriate and inappropriate applications of concepts. However, often it is difficult to avoid the issue of how concepts are used in a discussion of how they should be measured, so we will have more to say, on occasion, about the utilization of fractions and chances as we discuss the problems involved in measuring them.

Scope and Organization of the Monograph

The primary purpose of this monograph is to examine some of the issues involved in measuring the use of confinement by the justice system. Because the focus is on the justice system, we deal mostly with incarceration and imprisonment and have little to say about the more general topic of institutionalization. Furthermore, the realities of data availability forces us to illustrate most of our points with data pertaining to prisons rather than to other justice system facilities.

In conducting this research, we have relied primarily on published national and state data. The national data series, familiar to most criminal justice researchers, proved valuable. These series include: National Prisoner Statistics (NPS), Children in Custody (CIC), Uniform Parole Reports (UPR), National Probation Reports (NPR), and Uniform Crime Reports (UCR). The Bureau of the Census was the only other national data source utilized extensively.

However, to obtain more "finely grained" data, we turned to individual states, a number of which kindly provided us with useful published and unpublished reports. These materials considerably enhanced our ability to illustrate several measurement issues, especially with respect to the chances of imprisonment and incarceration.

No primary data collection efforts were initiated for our research, nor did we conduct any analyses of raw data files. With the exception of some special tabulations provided by the Bureau of the Census (on 1980 population counts), by the Federal Bureau of Investigation (on state-by-state UCR arrest counts) and by a few states that did not publish extensive annual reports, we relied on the published reports of state and federal agencies. This was a conscious choice at the beginning of the study. The rationale was (and is) that our ability to produce refined measures through costly manipulation of raw data sets that are not easily accessible, or through the use of unpublished materials that are not widely available, would not be of much value to the average

researcher or policy analyst in criminal justice. Rather, our intent is to demonstrate what can be done with information that is readily available.

Chapters II, III, and IV contain the core materials of this monograph. The chapters discuss the numerators and denominators of fraction and chance measures. Cross-sectional and longitudinal data are used to construct illustrations of various measurement problems.

Chapter V addresses measurement issues that pertain to indicators of the use of confinement other than fractions and chances -- specifically, time served and prevalence.

In Chapter VI, we attempt to accomplish two things. First, we try to relate the measurement issues discussed in the earlier chapters to research on current policy questions. We do not try to answer the questions; what we try to show is how measurement problems can affect the ways in which policy questions are approached and the conclusions that are reached. Second, we draw on our experiences in using available data sets to examine measurement issues. Some of the shortcomings of the data sets are described, and some modest proposals for improving available data are made.

CHAPTER II

DENOMINATORS OF FRACTION MEASURES

As we have defined them, fraction measures reflect the proportion of a given base population that is confined (imprisoned, incarcerated, institutionalized) at a given point in time. In this chapter, base populations -- the denominators of fraction measures -- are discussed. Chapter III deals with the numerators of fraction measures, and it concludes with a section that develops some conclusions about constructing appropriate fraction measures.

Inclusion of Numerator in Denominator

A fraction measure -- say, the fraction in prison -- refers to the proportion of the base population being held in prison at a given point in time. To be technically correct, the people counted in the numerator of a fraction measure should be counted in the denominator also; otherwise, the measure is a ratio of people in prison to people not in prison. Mathematically, when fraction measures are converted to ratio measures (by excluding from the denominator people who are counted in the numerator), the ratio measures will be greater than the corresponding fraction measures. But the relationship between the two sets of measures is not linear; it is multiplicative, so that the greater the value of a fraction measure, the greater the percentage increase when it is converted to a ratio

measure. For example, a fraction measure of 0.05 converts to a ratio measure of 0.0526 (an increase of 5.2 percent), while a fraction measure of 0.3 converts to a ratio measure of 0.4286 (an increase of 42.9 percent).

The data used for base populations in most fraction measures are drawn from federal or state estimates of the population of a jurisdiction in a given year. However, unless one works extensively with these various estimates, it is often difficult to know exactly what is included in the base population being used.

The U.S. Bureau of the Census, for example, utilizes a separate category of persons in group quarters, which is further subdivided into (a) inmates of institutions (including adult and juvenile correctional and detention facilities as well as mental hospitals, homes for the aged and dependent, homes and schools for the mentally handicapped, and several other types of facilities), and (b) persons in noninstitutional group quarters (including rooming houses, military barracks, college dormitories, and other types of quarters). In the 1970 census, the group quarters category accounted for about 5.8 million people: 2.1 million in institutions and 3.7 million in other group quarters. For the most part, persons in group quarters are counted in Census Bureau estimates of total resident population. However, the Bureau's monthly Current Population Survey (CPS) generally covers only the noninstitutional civilian population. There may be even less certainty about the exact composition of population estimates produced by various state and local agencies.

Fortunately, whether institutionalized persons are included in or excluded from the denominator does not have major effects on the types of fraction measures being examined in this monograph; the fractions are generally quite small. To take a relatively extreme example, we can look at a fraction measure composed of the following components: (a) the total number of persons in all types of institutions on the census date in 1970 in the numerator, and (b) the total resident population on the 1970 census date in the denominator. Among jurisdictions for which data are available (see U.S. Bureau of the Census, 1973), the District of Columbia has a fraction institutionalized (.01608) at the top of the distribution, while Hawaii (.00549) is at the bottom. Thus, the fraction for D.C. is 2.93 times as large as Hawaii's fraction. When these fractions are converted to ratios of persons institutionalized to persons not institutionalized, both increase only slightly -- D.C.'s to .01634 and Hawaii's to .00552 -- and the D.C. ratio is 2.96 times as large as the Hawaii ratio. When dealing with smaller fractions, such as the fraction in prison, the effects would be even smaller.

Exclusions from Base Population

Even the Census Bureau's inclusive measure of a state's resident population does not count some people who are within the state's borders at some time and who might end up in one of the state's institutions: visitors, tourists, migrant workers, and

other transient groups.* Of course, this problem is attenuated if regional fractions are being compared cross-sectionally, and it virtually disappears if national fractions over a period of time are being compared.

When states are being compared, the key question is: Do states vary substantially in the proportions of people within their borders who are nonresident transients? However, even if these proportions do vary substantially, effects on fraction measures would be negligible if (a) the absolute values of the proportions are very small, or (b) the fractions of nonresident, transient populations institutionalized (or incarcerated or in prison) are very low, relative to the fractions for resident populations. Unfortunately, we do not have direct, systematic estimates of the numbers of nonresident transients within the states, which are necessary to settle these issues. Therefore, the best that can be done is to make some informed guesses about the extent of the problem.

Various ways of trying to estimate indirectly the average proportion of people within a state's borders who are nonresident transients can be devised. For example, one can posit a direct relationship between changes in resident populations (particularly in-migration) and the proportion of transients -- under the assumption that among the populations that move into the various states

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*Transients who do end up in an institution would be counted among the state's population by the Bureau of the Census as persons in institutions.

the ratios of people who are transient to people who become residents are roughly constant across states. Another possible indirect indicator of the proportion of transients is the ratio of the number of auto repair and service station facilities in a state to the number of registered motor vehicles in the state -- under the assumptions that transients create a demand for such facilities beyond the demand generated by residents, that this "excess" demand is reflected in the ratio, and that variations in "excess" demand are related directly to variations in the proportions of nonresident transients across states.

After deriving the estimates from data published by the U.S. Bureau of the Census (1980), attempts to utilize them to resolve the issue of the impact of nonresident transients on fraction measures are not too successful. In the first place, the two estimates mentioned above are not very consistent with each other. For example, states such as Florida, Nevada, and Wyoming have had very high in-migration rates in recent years, while their ratios of automobile service facilities to registered vehicles are in the low to middle range relative to other states; the opposite is true for states such as Missouri, Kansas, and Massachusetts. Second, neither estimate is very "clean." The estimate based on in-migration obscures the numbers of transients in geographic areas that have experienced stability or even decline in resident populations but that still attract sizeable numbers of tourists, commuters, and other transients; New York and the District of Columbia are primary examples. On the other hand, the estimate based on

service stations and vehicle registrations fails to take into account the degree to which a state's population is concentrated or dispersed, and the amount of mass transportation available in a state.

Another approach to trying to determine the effects on fraction measures of not counting nonresident transients in the base population is to examine the numbers of transients who actually end up confined. In the 1974 Survey of Inmates of State Correctional Facilities (conducted by the Census Bureau for the Department of Justice), inmates were asked: "At the time of your arrest [for your present offense], in what city or town, county, and state were you living?" However, Census Bureau confidentiality rules require that information identifying the state in which the interview took place be deleted from the data tapes supplied to users.

The Census Bureau's report on Persons in Institutions and Other Group Quarters (U.S. Bureau of the Census, 1973) contains some data that are helpful in estimating, for the nation as a whole, the proportions of confined persons who were not previously residents of the states in which they were being held at the time of the census. In 1970, there were 121,364 prison and reformatory inmates who were not in the same institution in 1965 and whose area of residence in 1965 could be determined. For 75 percent of these inmates, their state of residence in 1965 and location of the prison in which they were held in 1970 were the same. The comparable figure for local jails and workhouses was also 75 percent, but in juvenile facilities,

the percentages were higher: 91 percent in public training schools, 85 percent in private training schools, and 88 percent in detention facilities.

Turning to more recent data from agency reports in individual states, we find that information about the prior residences of confined persons is not published for most states and when it is, the information is difficult to compare from state to state. The Texas Department of Corrections (1981:29) reports that the "place of residence" for 95 percent of the inmates present on Dec. 31, 1980 was Texas. The "length of residence in Florida" was six months or more for 86 percent of the inmates in that state's prisons on June 30, 1980, and it was one month or more for 95 percent (Fla. Dept. of Corrections, 1981:49). Nebraska was the "home state" listed for 80 percent of adult male offenders held in Nebraska's correctional facilities on June 30, 1980 (Neb. Dept. of Correctional Services, 1980:20-21). About 95 percent of felons newly received from court by the California Department of Corrections (1979:28-29) in 1979 had been in the state six months or more before the offense for which they were committed.

Although the information bearing on the numbers of nonresident transients in state institutions is not definitive, there are indications that, at least in correctional facilities, the proportions of nonresident transients are relatively small, and these proportions vary within a relatively narrow range across the states. This, of course, does not settle the issue of the extent to which

fraction measures would be affected by counting nonresident transients within base populations. However, it appears that any possible substantive effects would be small enough to be ignored safely in this monograph.

Another factor to take into account in selecting a population estimate for the denominator of a fraction measure is how military personnel are counted. The Census Bureau publishes estimates of the total population, the resident population, and the civilian population. The total population includes armed forces personnel stationed overseas; the resident population includes only armed forces personnel in the 50 states and the District of Columbia; the civilian population excludes all armed forces personnel. Whenever possible, estimates of the resident population are used in this monograph.

Demographic Subgroups as Base Populations

In the most commonly used fraction measure -- the "traditional" fraction -- the numerator consists of the total number of people in prison (incarcerated, institutionalized), and the denominator is the total population of the jurisdiction. Of course, subgroup-specific fractions can be computed -- for example, the number of females in prison divided by the number of females in the jurisdiction's population -- if the research is focusing only on a particular subgroup. However, what is more important here is the possibility that a sizeable portion of the variation (across jurisdictions or time) in "traditional" fraction measures might be due to differences in the subgroup structures of base populations. This possibility is based

on three assumptions: (a) that the fractions in confinement vary substantially among different population subgroups, (b) that the subgroup-specific fractions are similar in different jurisdictions (or time periods), and (c) that the subgroup structure of base populations differs substantially across jurisdictions (or time).

The next two sections of this chapter will examine some of these issues with cross-sectional and longitudinal examples. However, one point should be kept in mind. Even if all of the variation in "traditional" fraction measures can be attributed to differences in the population subgroup structures of different jurisdictions or time periods, interest in fraction measures should not cease. The issue of why population subgroups have widely different fractions confined would remain unanswered.

Cross-Sectional Illustrations

The illustrations that follow deal with fractions in prison and fractions incarcerated. The issue of differing subgroup structures among base populations is less relevant for measures of the fraction institutionalized because every major demographic subgroup is represented in some institution or another. On the other hand, the fraction confined in prisons or other penal institutions is at or near zero for some demographic subgroups. Thus, the subgroup-specific fractions in prison or incarcerated vary more starkly than do the subgroup-specific fractions institutionalized. In addition, the illustrations are limited to demographic

subgroups based on sex, age and race because these are the major subgroups for which data are available.

Sex

The sex distribution of the base population certainly appears to be a major candidate for a demographic factor that can explain some of the cross-sectional variation in state-by-state fraction measures. Sex-specific fractions in prison or incarcerated differ substantially. For example, in 1978, females constituted about 51 percent of the United States population but only about 4 percent of the year-end population of state and federal prisons and about 6 percent of the local jail population during February (BJS, 1980a and 1980c). The underrepresentation in juvenile custody facilities is less pronounced; at the end of 1979, females were 14 percent of the residents of public juvenile facilities and 28 percent of the residents of private juvenile facilities (OJJDP, 1980a and 1980b).

Despite the large size of the difference between sex-specific fractions in prison/incarcerated, this difference does not account for any of the variation among states in fraction measures based on the total population. There just is not a sufficient amount of variation in the sex distributions of the states to make a difference. According to the 1980 census, the proportion of males in the resident population ranged from a high of 53.0 percent in Alaska (one of only five states in which males exceeded 50 percent) to a low of 47.5 percent in New York (one of only four states in which males comprised less than 48 percent).

Age

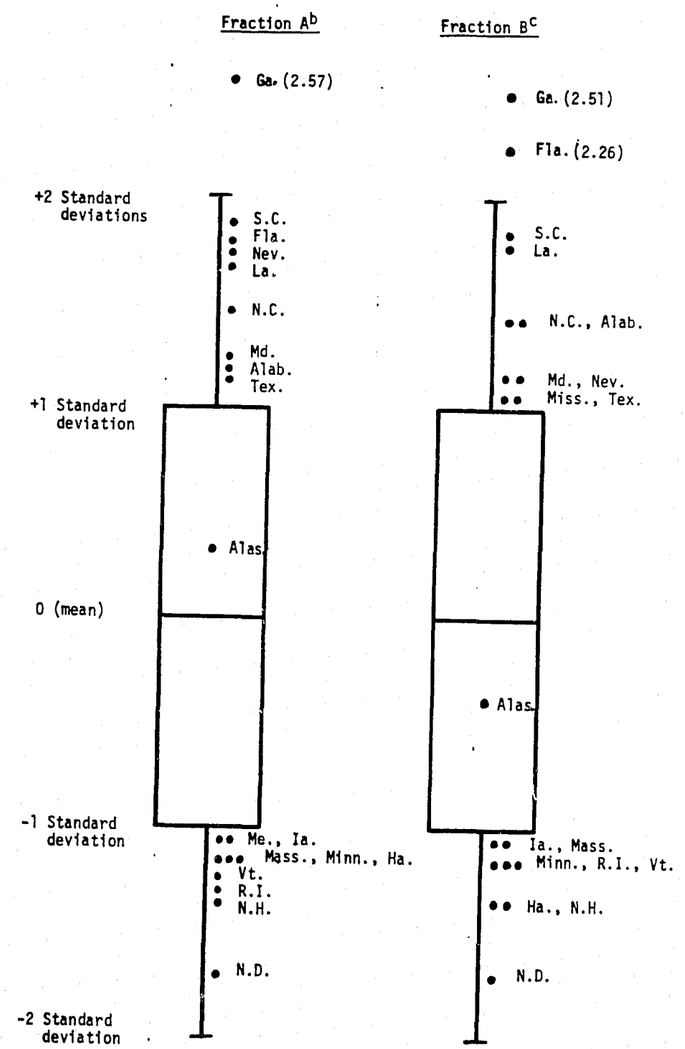
The age distributions of prison and jail inmates differ substantially from the age distribution of the general population. The 1979 survey of state prison inmates (BJS, 1982a) revealed a median age of 27; less than 1 percent were under 18, and only 4 percent were over 50. The 1978 survey of local jail inmates (BJS, 1980c) showed that population to be slightly younger than the jail population (median age = 25), but as in prisons, the bulk of the inmates were in the young to middle adult years (e.g., about two-thirds were between 20 and 34 years old).

The differences among states in age distributions of their resident populations -- while larger than the sex distribution differences -- are not large. Focusing on the 20-44 year old age group, Alaska is again an unusual case with 47.3 percent of its population in that age category; the next highest is Colorado with 42.2 percent. At the low end are Florida (33.5 percent in the 20-44 age category) and Arkansas (34 percent).

Figure 1 illustrates the minor effects on the cross-sectional distribution of the fraction incarcerated that occur when both the sex and age distributions of states' populations are taken into account. Two fractions were computed for each of the 50 states. Fraction A has the total number of prison inmates (year-end 1979) and the total number of jail inmates (February 1978) in the numerator and the total resident population (1980 census) in the denominator. The numerator of Fraction B counts only male prisoners and adult male jail inmates, while its denominator consists of the

FIGURE 1

Distributions of Selected States Around the Means of Two Fraction Measures[a]



[a] For ease of presentation, both fraction measures have been standardized with a mean of zero and standard deviation of one. With fractions multiplied by 100,000, unstandardized mean for Fraction A is 177.4 (s.d. = 76.2); for Fraction B, the mean is 908.8 (s.d. = 394.5).

[b] Total prison and jail inmates divided by total resident population.

[c] Male prison inmates and adult male jail inmates divided by resident male population between ages 20 and 44.

state's male population, 20-44 years old.* Although the mean and standard deviation of the Fraction B measures were much greater than the mean and standard deviation of the Fraction A measures, the coefficients of relative variation ($s/\bar{x}$) were very similar for the two arrays (.430 for Fraction A and .434 for Fraction B). Therefore, the scores were standardized ($\bar{x}$=o, s=1) for ease of presentation in Figure 1.

The data in Figure 1 are displayed in a modified form of the "box plot" described by McNeil (1977). In McNeil's usage, the boxes in the middle of the plots represent interquartile ranges. In Figure 1, the upper part of each box represents one standard deviation above the mean and the lower part represents one standard deviation below the mean; the lines connected to the boxes in Figure 1 extend to plus and minus two standard deviations from the mean. Thus, the box plots in Figure 1 are only meant to illustrate the extent to which states change locations on the distributions of Fraction A and Fraction B scores. With one exception, the only states identified in the box plots are those that lie more than one standard deviation away from the mean.

When the distributions of Fraction A and Fraction B scores are compared in Figure 1, it is apparent that there are few differences in the relative locations of states with high or low fractions incarcerated. Florida does move to a more extreme position when sex

*Actually, Fraction B is an estimate rather than a pure fraction because we did not have the data necessary to count only 20-44 year old males in the numerator.

and age distributions are taken into account (Fraction B), primarily because that state has a relatively small proportion of its population in the 20-44 age group. The state that showed the greatest shift in position between the two distributions of fraction scores is Alaska, though it falls within one standard deviation of the mean in both distributions. Alaska's score on Fraction A is about 0.31 standard deviation above the mean, while its Fraction B score is about 0.39 below the mean. This shift occurs because Alaska's population has both the highest proportion of males and the highest proportion of 20-44 year olds of any state.

Despite some changes for a few states, taking the age and sex structure of the base population into account does not have much effect on cross-sectional comparisons of the fraction incarcerated among states. In fact, the Pearson's product-moment correlation coefficient (r) and the rank-order correlation coefficient (Spearman's rho) between the Fraction A and Fraction B scores are both 0.98.

Race

While taking the sex and age distributions of base populations into account in fraction measures has, at best, minor effects on cross-sectional comparisons among states, taking racial distributions into account has substantial effects. Table 1 presents the basic information: (a) the percent black in each state's population, (b) an estimate of the fraction of 20-44 year old black males held in prison for each state, (c) an estimate of the fraction of

TABLE 1

Estimated Age-Sex-Race-Specific Fractions in Prison, 1979

State	Percent Black (1980 Census)	Estimated Fraction of 20-44 Year Old Black Males in Prison (per 100,000)[a]	Estimated Fraction of 20-44 Year Old White Males in Prison (per 100,000)[a]	Disparity Between Fractions[b]
Alabama	25.6	1956	422	4.64
Alaska	3.4	1901	472	4.03
Arizona	2.8	4371	608	7.19
Arkansas	16.3	3052	404	7.55
California	7.7	2025	383	5.29
Colorado	3.5	2319	346	6.70
Connecticut	7.0	4429	452	9.80
Delaware	16.1	5181	599	8.65
Florida	13.8	4327	730	5.93
Georgia	26.8	2758	614	4.49
Hawaii	1.8	216	98	2.20
Idaho	0.3	1829	462	3.96
Illinois	14.7	2347	270	8.69
Indiana	7.6	2158	441	4.89
Iowa	1.4	4360	320	13.62
Kansas	5.3	3043	361	8.43
Kentucky	7.1	2273	412	5.52
Louisiana	29.4	2706	385	7.03
Maine	0.3	831	378	2.20
Maryland	22.7	3303	291	11.35
Massachusetts	3.9	2490	188	13.24
Michigan	12.9	3876	368	10.53
Minnesota	1.3	3022	203	14.89
Mississippi	35.2	1712	383	4.47
Missouri	10.5	3311	346	9.57
Montana	0.2	1800	429	4.20
Nebraska	3.1	4376	287	15.25
Nevada	6.4	3949	707	5.59
New Hampshire	0.4	545	178	3.06
New Jersey	12.6	2311	202	11.44

(cont.)

Table 1 (cont.)

State	Percent Black (1980 Census)	Estimated Fraction of 20-44 Year Old Black Males in Prison (per 100,000)[a]	Estimated Fraction of 20-44 Year Old White Males in Prison (per 100,000)[a]	Disparity Between Fractions[b]
New Mexico	1.8	3253	717	4.54
New York	6.2	2715	396	6.86
North Carolina	22.4	3264	698	4.68
North Dakota	0.4	194	126	1.54
Ohio	10.0	3651	371	9.84
Oklahoma	6.8	3223	561	5.75
Oregon	1.4	4295	514	8.36
Pennsylvania	8.8	2499	190	13.15
Rhode Island	2.9	3810	346	11.01
South Carolina	30.4	2654	745	3.56
South Dakota	0.3	1485	366	4.06
Tennessee	15.8	2573	472	5.45
Texas	12.0	3575	674	5.30
Utah	0.6	3288	328	10.02
Vermont	0.2	1307	438	2.98
Virginia	18.9	2675	389	6.88
Washington	2.6	3233	431	7.50
West Virginia	3.3	2343	302	7.76
Wisconsin	3.9	3998	240	16.66
Wyoming	0.7	1745	400	4.36

[a] Fractions are estimates because numerators are not completely age-specific, although the bulk of the prison population in each state is in the 20-44 age group. Numerators are yearend 1979 National Prisoner Statistics figures for the numbers of black (or white) males under state jurisdiction. Denominators are 1980 census counts of the numbers of black (or white) males, 20-44, in the resident population.

[b] Estimated fraction of 20-44 year old black males in prison divided by estimated fraction of 20-44 year old white males in prison.

20-44 year old white males held in prison for each state, and (d) the amount of disparity between the two fraction measures.

In every state, the sex-age-race-specific fraction for blacks is higher than the corresponding fraction for whites. However, the amount of difference varies widely across the states. The fraction for blacks is about one and one-half times greater than the fraction for whites in North Dakota, but it is at least a dozen times greater in six states. In addition, standardizing by race does not have a major impact on the variability of the fraction measures across states. The fractions for whites in Table 1 show only slightly less variability (coefficient of relative variation = .413) than the fractions for blacks (.433), and these race-specific fractions are not much less variable than the overall fraction for 22-44 year old males (CRV= .449). Finally, the relative rankings of the 50 states differ substantially on the two fraction measures; the Spearman's rho between the two sets of rankings is only 0.32.

Because there are sizeable differences between the fractions of blacks and whites incarcerated in every state and because states differ substantially in the racial distributions of their general populations, one might suppose that the interstate variation in overall fractions incarcerated will disappear once race is taken into account. The findings noted above show why this supposition is incorrect. However, the fraction for blacks is consistently higher than the fraction of whites in every state, so the inter-state variation in the racial distributions of resident populations

does account for some of the inter-state variation in fraction measures. This is illustrated in Table 2.

Table 2 shows the partial correlations between 1979 yearend state prison populations and four independent variables, controlling for total state population in each case. After taking the total size of the state's population into account, the number of residents between the ages of 20 and 44 and the number of male residents do not account for much of the variation in prison populations. Surprisingly, the partial correlation with number of adult UCR Part I arrests is also very small (.171). Of the four variables included in Table 2, only the number of black residents in the state has a substantial correlation with the number of state prisoners after total state population is controlled (.612).

Similar findings appear in Table 3, where the fraction in prison (number of prisoners under state jurisdiction at the end of 1979 divided by the state's total resident population count in 1980) is used as the dependent variable in a multiple regression analysis. Table 3 shows the impact on R^2 as each of the independent variables are entered in a step-wise fashion, in the order displayed; it also shows the beta values for the regression equation using all four independent variables simultaneously. When the fraction in prison is regressed on the first two independent variables -- percent of population 20-44 years old and percent of population male -- only a small proportion of the variance is explained (R^2=.164). Addition of the adult arrest rate produces a substantial increase in explanatory power (R^2 increases to .381. But even

TABLE 2

Partial Correlation Analysis of Fraction in Prison

Independent Variable	Controlling For	Partial Correlation With
Number of prisoners under state jurisdiction at yearend 1979	Total resident population of state, 1980 Census	(1) State residents 20-44 years old, 1980 Census = —.088
		(2) Male residents of state, 1980 Census = .003
		(3) Adjusted number of adult Part I arrests, 1979 UCR[a] = .171
		(4) Black residents of state, 1980 Census = .612

[a] Adjusted figures are used because the proportion of the state population residing in law enforcement jurisdictions that report arrest data to the Uniform Crime Reports program varies from state to state. The ratio of the total state population to the state population covered by arrest data was computed for each state; then, the number of reported arrests was multiplied by the ratio.

TABLE 3

Multiple Regression Analysis of Fraction in Prison

Dependent Variable: Fraction of total state population held as prisoners under state jurisdiction, 1979

Independent Variable	R^2	R^2 Change	Beta in Final Equation
Percent of population 20-44[a]	.045	.045	—.012
Percent of population male[a]	.164	.119	.156
Adjusted adult UCR Part I arrest rate[b]	.381	.217	.390
Percent of population black[a]	.650	.269	.620

[a] From 1980 Census.

[b] Set footnote to Table 2.

after the effects of these three variables are taken into account, the addition of proportion black as an independent variable still produces a large increase in R^2 (to .650). The importance of the racial distributions of the states' populations is confirmed by the beta values for the four-variable model; the direct effect of percent black is by far the greatest of the four independent variables when they are used together.

The data show that racial distributions of state populations do have impacts on total fraction measures because there is substantial interstate variation in racial compositions of state populations and because the fraction of blacks in prison (or incarcerated) is higher than the comparable fraction for whites in every state. However, the disparity between black and white fractions also varies substantially from state to state, and there is a great deal of independent interstate variation in each of the race-specific fractions. From the limited viewpoint of this section of the report, differing racial compositions of base populations do not account for all, or even most, of the tremendous cross-sectional variation among states in fractions in prison/incarcerated -- although they do account for much more variation than do the age and sex compositions of resident populations. This section has shown that race is an important substantive issue in questions about the use of confinement, and we will be raising the issue in later portions of this report as other measurement problems are discussed. However, the sheer sizes of the differences between race-specific fraction measures, raises the point of the next section.

Sizes of Subgroup-Specific Fraction Measures

In the preceding pages, the discussions of subgroup-specific fraction measures has focused on the issue of whether variations in the demographic compositions of base populations could account for the substantial cross-jurisdictional variations in fractions confined. But even a cursory examination of subgroup-specific fraction measures produces the realization that some segments of the general population have proportions under lock and key that are striking when compared to the relatively low fraction of the total population confined. An example from one state will suffice.

The Virginia Department of Corrections publishes a simultaneous sex-race-age breakdown of the felons in its state correctional system at the end of the fiscal year, June 30 (Va. Dept. of Corrections, 1980:51). In 1980, 8,521 felons were begin held; this produces a fraction (per 100) of 0.159 for the total resident population of the state. However, 97 percent of the inmates were male, and when only males are used in the numerator and denominator, the fraction (per 100) is 0.314. Like all states, Virginia has a higher percentage of blacks in its prison system than in its resident population: the fraction (per 100) of black males in prison in 1980 was 1.005. Finally, when attention is restricted to the sex-race-age group with the highest likelihood of being confined in prison -- black males in their twenties -- the fraction in prison on June 30, 1980 in Virginia was 2.813.

The Virginia example was not selected because it is unique. The age and sex distributions of Virginia's prison inmates are similar to those in other states, and Table 1 showed that the

race-specific fractions in prison in Virginia are not out of line with the other states.

Although the fraction of any state's total population held in prison does not appear very large -- less than two-tenths of one percent in the Virginia example -- the representation of various demographic subgroups within the fraction varies strikingly. For some of these subgroups, the fraction in prison is substantially higher than the overall fraction; in the Virginia example, almost three percent of the state's 20 to 29 year old black males were confined in prison on June 30, 1980. This fraction would increase to an even more striking level if numerators and denominators could be refined to reflect even more specific demographic subgroups: 20 to 29 year old urban black males with annual incomes in the lower quartile of the income distribution, for example. And if inmates of justice system facilities other than prisons could be added to the numerators, the fractions would rise even higher.

As the example shows, when interest focuses on absolute levels of confinement, traditional "rates of imprisonment" (or incarceration), which use total resident populations in their denominators, are misleadingly small. The rates are diluted by inclusion, in their denominators, of large segments of resident populations that have little or no likelihood of showing up in prison or jail populations. This masks the existence of relatively substantial fractions confined among certain segments of the population.

Longitudinal Illustrations

Earlier, it was shown that there is not a great deal of cross-sectional variation in the age and sex distributions of the resident populations of the states, but that there is substantial variability in the populations' racial compositions. Attention now shifts to the national level and the changes that have occurred in the demographic composition of the United States population, particularly during the last two decades.

In general, the sex distribution of the U.S. population has not changed substantially: males comprised 48.6 percent of the resident population in 1980, down from 48.7 percent in 1970, 49.2 percent in 1960, and 49.6 percent in 1950. For the purposes of this monograph, the change in sex distribution is even less important than the overall numbers imply, because most of the change has occurred in the older age groups.

The relative distributions of the various racial and ethnic groups over time in the U.S. is more difficult to measure, primarily because the development of a separate "Spanish Origin" category in Census Bureau data is relatively recent. Blacks are still the largest racial/ethnic minority group in the U.S., increasing slightly from the 9.9 percent of the resident population in 1950 to 11.7 percent in 1980. However, there are indications that the "Spanish Origin" category is one of the most rapidly growing racial/ethnic groups in the U.S.; persons in this category comprised 6.4 percent of the resident population in 1980, but were distributed very unevenly among the states. Furthermore, national prisoner data sets have not contained separate categories for

"Spanish Origin" or Hispanic prisoners in the past. An attempt was made to gather this information for the annual Prisoners in State and Federal Institutions report in 1979, but the information was missing for some states and was estimated for others.

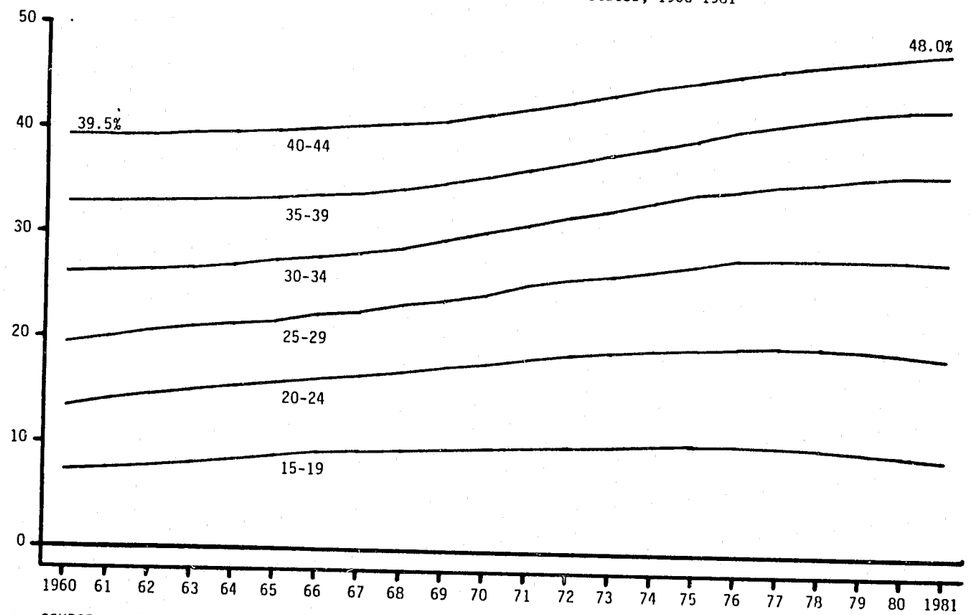
The age distribution of the U.S. population has been changing, a fact which is widely recognized because of the effects of the post-World-War-II "baby boom" and the strains on the Social Security system. The discussion in this section will focus on these changes in the age distribution.

Figure 2 illustrates changes in the age distribution of the resident U.S. male population from 1960 to 1981. The figure shows the percentages of the male population contained in six age groups of five-year intervals from 15 to 44 -- the age groups to which most "clients" in the criminal justice system belong. The proportion of the U.S. males falling between 15 and 44 years old increased from about 39 percent in 1960 to 48 percent in 1981, but the increase did not occur evenly among the six age groups represented in Figure 2. The youngest age group (15-19 year olds) rose from 7.5 percent of the male population in 1960 to about 10 percent in 1972, as males born in the post-World-War-II "baby boom" reached this age group. During the next few years there was a slow increase, peaking at 10.3 percent of the male population in 1976, and this was followed by a decline to 9.3 percent at the end of the period.

The next highest band in Figure 2 represents the 20-24 age group. Reflecting the movement of population age cohorts into older groups over time, the proportion of 20-24 year olds also

FIGURE 2

Percent Distribution of Six Age Groups
Within Resident Male Population of United States, 1960-1981



SOURCE: U.S. Bureau of the Census, Estimates of the Population of the United States by Age, Sex, and Race Series P-25, various years.

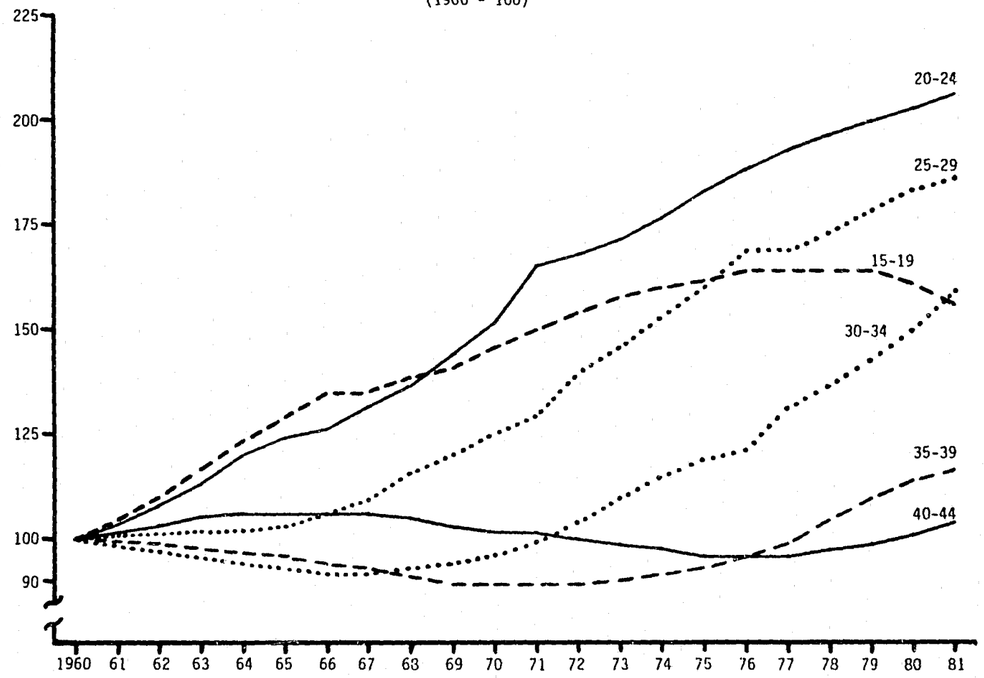
increased between 1960 and 1981, but the pattern of the increase lags behind the pattern for 15 to 19 year olds. The proportion of 20 to 24 year olds grew relatively slowly until the mid to late 1960s, then began a rapid growth that did not slow until the mid to late 1970s. At the beginning of the period shown in Figure 2 (1960), the 20-24 age group contained a smaller proportion of males (6 percent) than any of the six age groups displayed in Figure 2, but in 1981, it accounted for a higher proportion (9.8 percent) than any of the others.

The changing widths of the four remaining bands in Figure 2 also reflect the movement of the "baby boom" births through the age structure of the male population. Each of the four age groups between 25 and 44 years old (25-29, 30-34, 35-39, and 40-44) declined as a percentage of the male population during the beginning of the period shown in Figure 2; the decline was eventually reversed for all groups, but at different points in time. The percentage of males in the 25-29 age group began to increase again in the mid 1960s, but the turnaround did not occur until the early 1970s for the 30-34 age group, the mid 1970s for the 35-44 age group, and the late 1970s for the 40-44 age group.

Figure 3 presents the data on the changing age composition of the resident U.S. male population in a different way, reflecting changes in the numbers of males in each of six age groups. The lines in Figure 3 show the increases or decreases in the numbers of males in the six age groups, with the 1960 population of each age group set at 100.

FIGURE 3

Changes from 1960 Levels in Numbers of Resident United States Males in Six Age Groups, 1960-1981 (1960 = 100)



SOURCE: U.S. Bureau of the Census, Estimates of the Population of the United States by Age, Sex, and Race, Series P-25, various years.

Between 1960 and 1981, the total resident male population increased by 26 percent. But Figure 3 shows that the patterns varied substantially by age group. For example, the number of 15-19 year old males rose rapidly to the point where there were 64 percent more in 1976 than in 1960; after 1976, the numbers leveled off, even declined, so that there were fewer 15-19 year old males in 1981 than in 1976.

The 20-24 and the 25-29 age groups showed virtually constant growth between 1960 to 1981, showing total increases of 107 percent and 87 percent, respectively; however, the numbers of 20-24 year old males can be expected to decline in the near future, followed by a later decline in the number of 25-29 year old males. In contrast, the numbers of males in the remaining three age groups (30-34, 35-39, and 40-44) should continue to increase for some time to come, having rebounded from earlier decreases.

Although not displayed separately, the patterns of change in age structure among 15-44 year old males are similar for whites and blacks. However, the relative increase in numbers has been greater among black males, especially in the younger age groups; the numbers of black males in the 15-19, 20-24, and 25-29 age groups increased by 99 percent, 142 percent, and 108 percent, respectively, between 1960 and 1981. This differential is important for the purposes of this monograph because, as shown earlier, the fraction imprisoned is much greater among blacks than among whites.

With the age composition of the male population shifting between 1960 and 1981, as indicated in Figures 2 and 3, one would

expect changes in the commonly computed crime, arrest, and imprisonment rates that use total population as their denominators. The changes would be expected even if there were no changes in criminal tendencies or in arrest and imprisonment policies. Furthermore, the age distribution of people most highly represented in crime/arrest statistics is somewhat lower than the age distribution of people incarcerated,* so the numbers of crimes, arrests, and persons confined should be differentially affected by changes in the age structure of the population. Thus, increases in crimes known to the police and arrests, especially during the 1960s, must be viewed in light of the rapidly increasing numbers of males in the 15-19 and 20-24 age groups, while the expansion of prison populations since the early 1970s must be viewed in light of the tapering off of the increase in the numbers of younger males and the relatively greater growth in the 20-24, 25-29, and 30-34 age groups.

Figure 4 illustrates the effects of taking longitudinal changes in the age composition of the population into account when computing fractions in prison. Two fractions are charted from 1960 to 1981. Both fractions use the number of sentenced state and federal prisoners at yearend of each year in their numerators. The disjunction in 1977 occurs because of a change in National Prisoner

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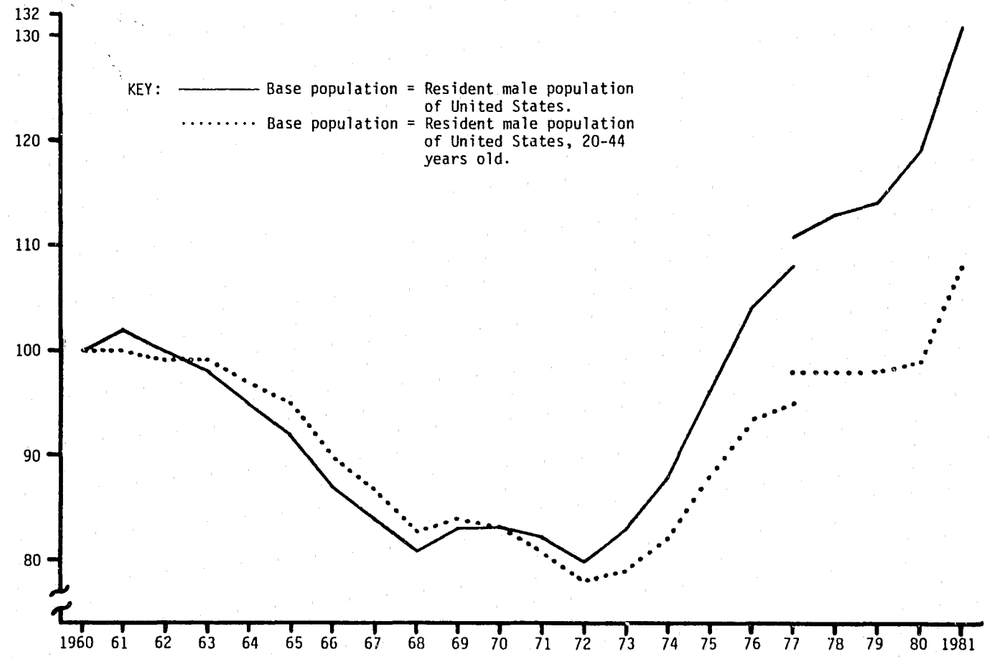
*For example, among all arrestees in 1980, the median age was between 22 and 23, and the median age for arrestees in Part I crimes was slightly above 19 (computed from FBI, 1981:200-201). In contrast, the median age of jail inmates in February 1978 was 25.3 (BJS, 1980c:12), and the median age of state prison inmates in November 1979 was 27.3 (BJS, 1982a:2).

FIGURE 4

Changes from 1960 Levels in Two Measures of the Fraction of Male Prisoners in State and Federal Institutions, 1960-1981[a] (1960 = 100)



[a]Beginning in 1977, prisoners under the jurisdiction, rather than in the cusotdy, of state and federal correctional agencies were counted. Custody and jurisdiction counts are both shown for 1977.

SOURCE: Counts of male prisoners in state and federal institutions from BJS, 1982c. Resident male population counts from U.S. Bureau of the Census, Estimates of the Population of the United States by Age, Sex, and Race, Series P-25, various years.

Statistics counting rules; up until 1977, counts were based on the numbers of prisoners in actual custody, and from 1977 on, counts were based on prisoners under the jurisdiction of prison agencies (BJS, 1982c:2). One set of fraction measures (charted with the solid line) uses total numbers of resident U.S. males in its denominators, while the other set of fractions (dotted line) uses numbers of 20-44 year old males in its denominators. To facilitate comparisons, both sets of fractions were computed from a base in which the fraction for 1960 equals 100, so the lines illustrate percent changes from the 1960 fraction.

Both sets of fraction measures in Figure 4 show general declines from 1960 to 1972 and substantial increases thereafter. In the pre-1972 period, the measures are very close to each other, but after 1972 -- although both measures rise -- the lines diverge strikingly. The reason for the differences before and after 1972 lies in the relative growth rates of the total male population and the 20-44 year old male population. In the first half of the time period reflected in Figure 4, the numbers of 20-44 year old males and the total numbers of males increased at approximately the same rate. But after 1972 (actually, after 1970), the 20-44 year old segment of the male population grew at a faster rate than did the total male population.

Another way to examine the effects of changing population age structure on fractions confined is to compute age-specific fractions at one point in time, apply those fractions to the numbers of persons in the same age groups during different time periods to produce expected numbers of persons confined, and

compare the expected with the actual numbers of person confined. Unfortunately, the limited availability of relevant, standardized data pertaining to confined populations makes this strategy much easier to suggest than to implement. Data on the characteristics of prison populations are available for 1960 (Fed. Bureau of Prisons, 1965). These data suffer from a number of shortcomings. For example, some states are not included, and the figures for other states were estimated. In addition, age and race characteristics were reported only for "felony prisoners continuously confined in state prisons," which excludes, primarily, all federal prisoners and state felony offenders who had been paroled at some point but who had returned to prison as violators under the same sentence. Nevertheless, the distribution of 150,702 prisoners is reported for nine age categories within each of two racial groups, white and nonwhite (see Fed. Bureau of Prisons, 1965:63). To illustrate the method suggested above, we treat the age/race distribution of the 150,702 prisoners as if it represents the age/race distribution of all 212,953 sentenced prisoners in state and federal institutions at yearend 1960 (BJS, 1982c:2). The illustration further assumes that all of the prisoners are male (96.4 percent in 1960 and 96.0 percent in 1981 were, in fact, male) and that prisoners in the "under 20" age category are all 18 or 19 years old.

Under these assumptions, 18 fraction measures were derived (nine age categories in each of two racial groups). The fractions were constructed in a way that insured that, when they were multiplied by the numbers of males in the corresponding age/race groups

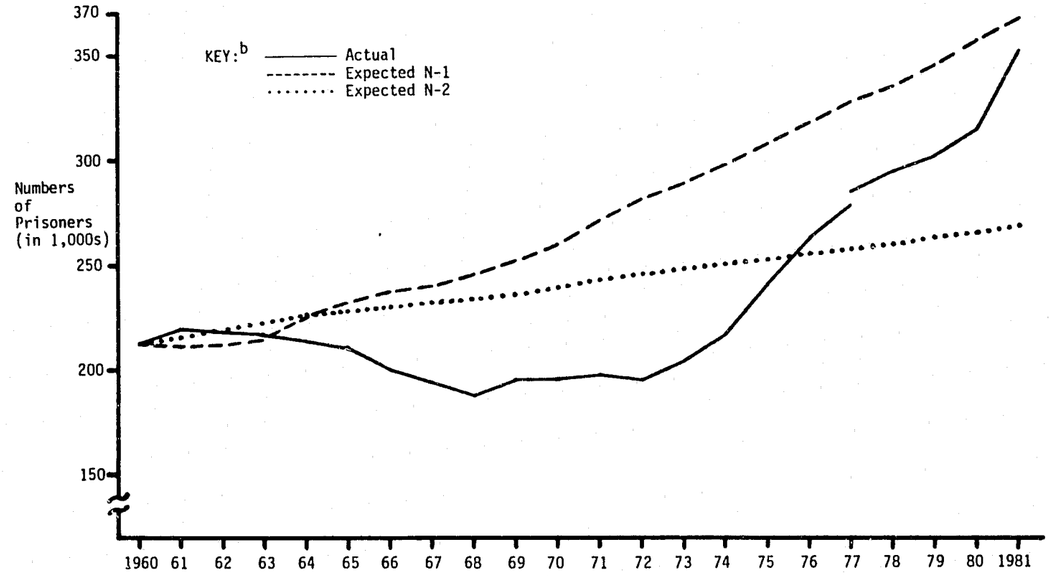
of the 1960 resident U.S. population and the products were summed, the total would equal 212,953 (the total sentenced prisoners held in state and federal prisons at yearend 1960). The same age-race-specific fractions were then multiplied by the corresponding age/race counts for resident U.S. males in each year from 1961 to 1981. For each year, the sum of the products represents an expected number of people imprisoned, given no change in imprisonment practices during the period. The expected numbers derived from this procedure are charted (dashed line) in Figure 5 as "Expected N-1."

Along with the Expected N-1 numbers in Figure 5 are the actual numbers of prisoners at yearend (BJS, 1982:2), plotted with a solid line and labeled, "Actual N." Finally, the dotted line in Figure 5, labeled "Expected N-2," represents expected numbers of prisoners based on the traditional "rate of imprisonment" -- that is, the fraction produced by dividing the total number of prisoners in 1960 by the total resident male population in 1960 was multiplied by the total resident male population in each subsequent year to produce expected numbers of prisoners.

If one were trying to evaluate how imprisonment practices changed after 1960, a different explanation would be required, depending on which set of expected numbers in Figure 5 were used. Expected N-1 and N-2 rise through the entire period -- not surprisingly, because the total male population and its 20-44 year old component both grew steadily from 1960 to 1981. However, Expected N-1 (derived from age-race-specific fraction estimates in 1960) grew much faster than Expected N-2 (derived from an estimate of the overall fraction of males in prison in 1960) because

FIGURE 5

Actual and Expected Numbers of Prisoners
In State and Federal Correctional Facilities, 1960-1981[a]



[a]Beginning in 1977, actual numbers reflect numbers of prisoners under the jurisdiction, rather than the custody of state and federal correctional facilities. Custody and jurisdiction counts are both shown for 1977.

[b]See text for description of how Expected N-1 and Expected N-2 were derived.

the numbers of 20-44 year old males increased at a faster rate than did the total numbers of males, and the numbers of 20-44 year old nonwhite males increased at an even faster rate.

From the mid-1960s through the early 1970s, the yearend counts of state and local prisoners were lower than in 1960. Therefore, both sets of expected numbers of prisoners are higher then the actual numbers during this period. But the gap between Actual and Expected N-1 -- which rises more rapidly than Expected N-2 -- is greater than the gap between Actual and Expected N-2. After the mid-1970s, the situation changes dramatically. The actual number of prisoners began to increase in the early 1970s, and the rate of this increase has been so great in recent years that, in 1976, the actual number of prisoners forged ahead of the number predicted by Expected N-2, and in recent years, the gap between Actual and Expected N-1 has closed considerably.*

In sum, an analysis that compared actual numbers of prisoners to projections based on the non-age-race specific fraction in prison in 1960 would conclude that the use of imprisonment fell below expectations during the period from the mid-1960s to the mid-1970s, but exceeded expectations thereafter. However, an analysis that compared actual numbers to projections derived from age-race-specific fractions in 1960 would conclude that the use of imprisonment dropped further and further below 1960 levels

*In fact, given the current pace of additions to prison populations -- which shows no signs of abating -- the actual numbers of prisoners will almost certainly exceed the numbers predicted by Expected N-2 during the early to mid-1980s.

until about 1972, and that since then, it has returned rapidly to the level experienced in 1960.

At this point, two caveats about the preceding illustration are in order. First, the projections must not be taken too seriously because of the limitations of the 1960 data on which they are based and the broad assumptions that had to be made in order to use those data. Second, even if projections using more precise data were to produce similar results, one would have to exercise great caution in interpreting the results. For example, comparing Actual to Expected N-1 in Figure 5, once might be tempted to conclude that the criminal justice system was "lenient" from the mid-1960s through the mid-1970s and that the system was only returning to "normal" levels of imprisonment by 1981. But what is "lenient" or "normal" varies with which base year is chosen for the computation of expected numbers of prisoners. It happens that 1960 was very close to one of the cyclical peaks in the overall fraction in prison in the United States. Had age-race-specific fractions been computed for some other year -- on the basis of the 1973 Census of Prisoners in State Correctional Facilities (LEAA,1976), for example -- the patterns in Figure 5 would have been quite different. Projections of expected numbers of prisoners, backward and forward from 1973, would have indicated that the actual numbers of prisoners held had exceeded expectations in both the early and late time periods of the graph.

Before leaving the illustration of expected and actual numbers of prisoners, we will discuss one other type of analysis that the technique allows. Because age-race-specific fraction measures were

used as bases for computing expected numbers of prisoners in each year, the procedure produces, for each year, expected numbers of prisoners in each of the age/race groups. This allows comparisons to be made between the expected and actual age/race distributions of prisoners in any given year for which data about prisoners are available. When there is a disparity between the actual and projected numbers of total prisoners -- as there is for most of the years in our example -- comparisons of the actual and projected age/race distributions of prisoners might uncover some clues about the source of the disparity.

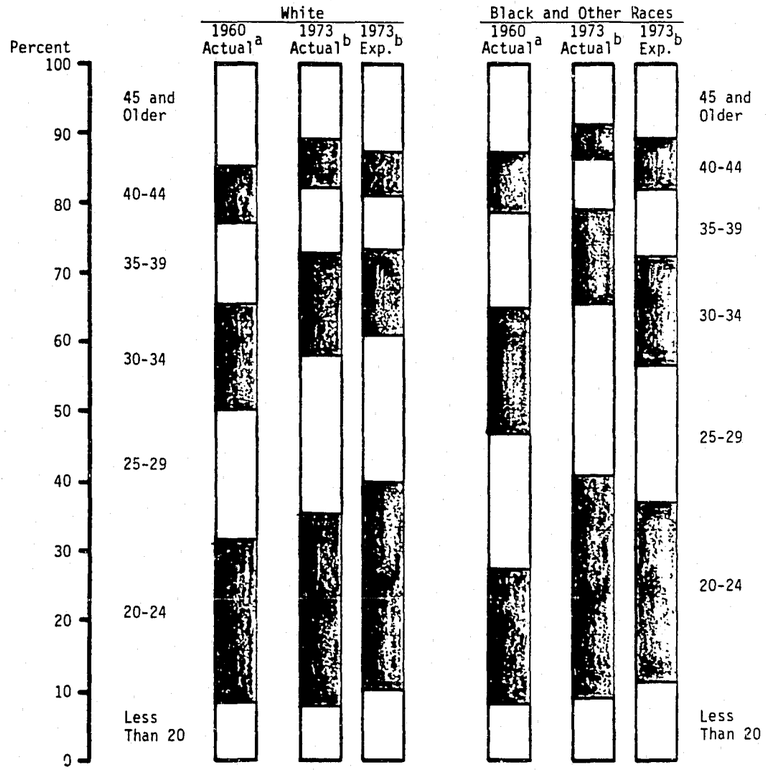
Age/sex distributions of state prisoners are available from the 1974 Survey of Inmates of State Correctional Facilities (LEAA, 1979b). The data were collected in January 1974, so they will be compared to our projected age/race distribution of inmates for yearend 1973.

Figure 6 shows, for each of two racial groups, three prisoner age distributions: (1) the actual age distribution at yearend 1960, estimated from Federal Bureau of Prisons data, (2) the actual age distribution at yearend 1973, under the assumption that the January 1974 survey of state inmates reflects the characteristics of state and federal inmates at yearend 1973, and (3) the expected age distribution, derived from applying the age-race-specific fractions in prison in 1960 to the resident male population in 1973.

Among white inmates, the actual and expected age distributions at yearend 1973 are fairly consistent, although the expected

FIGURE 6

Race-Specific Age Distributions of State Prison Populations; Actual Distributions in 1960, and Expected Distributions in 1973



[a]Yearend 1960 distributions derived from Fed. Bureau of Prisons, 1965.

[b]Actual yearend 1973 distributions reflect January 1974 figures in LEAA, 1979b. See text for description of how expected yearend 1973 distributions were derived.

distribution predicted slightly larger percentages of white inmates in the oldest and in the two youngest age categories than was the actual case. However, the expected age distribution among white inmates did reflect the major changes in the actual age distributions between 1960 and 1973: increases in the proportions of white inmates in the 20-24 and 25-29 age categories, and decreases in the proportions of inmates in the three oldest age categories.

For inmates in the black and other racial categories, the actual and expected age distributions at yearend 1973 were not as consistent as the distributions for white inmates. The expected 1973 age distribution did reflect the decreases in the proportion of black/other inmates in the three oldest age categories that actually occurred between 1960 and 1973, although it underestimated the size of the decrease. Correspondingly, the expected age distribution substantially underestimated the very large increases in the proportions of 20-24 and 25-29 year old inmates that actually occurred between 1960 and 1973 among blacks and other racial groups.

The rather close correspondence between the actual and expected age distributions of white inmates in 1973, in contrast to the much more substantial disparities between the actual and expected age distributions among black/other inmates, leads to the suspicion that the gap between the actual and estimated <u>total</u> inmate population in 1973 (see Figure 5) is related to changes that affected the two racial groups differently. This suspicion is

supported by a disparity between the actual and expected racial distributions of the prison population in 1973. The 1960 data indicated that 39.4 percent of the prisoners were members of racial groups other than white. Our computations produce an expected percentage of 41.2 for 1973, but the actual figure for black/other prisoners in 1973 was 49.0 percent -- 7.8 percentage points above the expected level. Interestingly, in 1979, when the actual and expected numbers of total inmates had begun to converge again (see Figure 5), our computations show an expected figure of 43.8 percent black/other inmates, while the acutal figure in November 1979 (BJS, 1982a) was 50.3 percent -- a differential of 6.5 percentage points.

The most reasonable conclusion that can be reached from the information just presented is that the gap between actual and expected levels of imprisonment from the mid-1960s through the mid-1970s resulted primarily from declines in the fractions of whites imprisoned. However, it should be stressed again that the longitudinal materials that have been presented in this section are meant to illustrate measurement issues and approaches to analyzing fractions confined by taking changes in base populations into account. The weaknesses of the data on which the illustrations are based limit the advisability of drawing substantive conclusions from the analyses.

Before turning to an examination of the numerators of fraction measures in Chapter III, two points should be noted concerning the

longitudinal analysis of base populations. First, the changes in the age/race composition of the resident United States population that we have been dealing with -- although significant -- occur in a fairly smooth and somewhat predictable fashion over the course of several decades. But the trends for individual jurisdictions within the nation can be much more abrupt and may even change in directions that differ from national trends: This is because the populations of individual jurisdictions are more sensitive to in-migration and out-migration. Therefore, trends in the composition of the national population should not be taken as indicative of trends in individual jurisdictions.

Finally, our lengthy illustration of longitudinal changes in a base population dealt exclusively with the fraction in prison and focused on males in the age groups between 15 and 44, and in some cases, between 20 and 44. A more thorough analysis of fractions confined would require dealing with more diverse base populations. Females, for example, comprised 47 percent of the more than two million inmates of all types of institutions in 1970, and persons 65 years old or older comprised 45 percent (U.S. Bureau of the Census, 1973:1-2).

Although more inclusive analyses of the use of confinement are worthy of pursuit, this monograph will continue to focus on the institutions of the justice system -- prisons, jails, and juvenile facilities. In the next chapter, data about people held in justice system institutions will be used to explore the composition of the numerators used in measures of fractions in prison and fractions incarcerated.

CHAPTER III

NUMERATORS OF FRACTION MEASURES

Just as the compositions of base populations can change over time or differ across jurisdictions, the numerators of fraction measures can show similar diversity. This chapter addresses two broad issues concerning the features of numerators in fraction measures: (a) the definitional boundaries that determine which people are counted in the numerator and which are excluded, and (b) variations within the groups of people that are counted. Much of the following discussion of definitional boundaries and internal variations is pertinent to numerators in both fraction and chance measures -- except that the numerators of chance measures are comprised of admissions to confinement during a given time period rather than numbers of persons confined at a specified point in time.

Definitional Boundaries

By "definitional boundaries," we mean those laws and administrative regulations that determine what category of institution a confined person is counted as being in. These boundaries can differ among jurisdictions and can change over time within a single jurisdiction. A good example is the age boundary separating the juvenile and adult systems. In most states, juvenile courts have

original jurisdiction over persons under 18 years old who commit crimes, but other states set 16 or 18 as the maximum age; states also differ in the requirements they set for waiving juveniles from juvenile to adult court. To further complicate matters, states' juvenile court age cut-off points and the waiver requirements change over time (see Davis, 1980).

The issue of definitional boundaries is related to the three levels of generality for fraction and chance measures -- institutionalization, incarceration, and imprisonment -- that we discussed in Chapter I. When the fraction institutionalized is the subject of inquiry, definitional boundaries are not very relevant because confined populations are aggregated across boundaries to form a numerator. When the fraction incarcerated is used, the definitional boundaries that determine allocations of people to justice system institutions -- prisons, jails, juvenile facilities -- are not relevant, but differences (or changes) in the rules for allocating people to institutions run by different systems (e.g., justice system versus mental health system) are important. Finally, definitional boundaries take on their greatest importance when imprisonment is the focus of attention. In its most common usage, the "rate of imprisonment (whether a fraction or a chance measure) incorporates only those confined persons who are in the custody of, or under the jurisdiction of, a state's adult prison authority. Therefore, analyses focusing on the fraction in prison must take into consideration not only the definitional boundaries between the justice system and other systems, but also the definitional

boundaries that determine how people are allocated among the institutions that are within the justice system. Because the "rate of imprisonment" is the most frequently employed measure of the use of confinement, the illustrations that follow deal with definitional boundary issues that apply to the fraction in prison (or the chance of imprisonment).

Allocations by Age

As mentioned, states vary on the age limitations set for the jurisdiction of the juvenile court and on the criteria for waiving juveniles to adult court. In addition, the available dispositions for juveniles -- whether convicted in juvenile or adult courts -- vary across jurisdictions; for example, some states allow juvenile court judges to commit adjudicated delinquents to adult institutions (see Davis, 1980). Because of these differences, counts of the numbers of persons held in states' adult prison systems, which are typically used as numerators for fraction measures, are not precisely comparable.

Table 4 shows age distributions among young inmates in ten state prison systems. Such data are not widely available in comparable form in state reports, but the entries in Table 4 do illustrate cross-state differences in the extent to which young offenders are represented in prison populations. One of the most striking examples is North Carolina in which juvenile court jurisdiction ends at age 16; about 4 percent of the North Carolina prison inmates are less than 18 years old, compared to less than 0.5 percent in Arizona, Massachusetts, Pennsylvania, and Wisconsin.

TABLE 4

Proportions of Young Offenders in Selected State Prison Systems

State	Percent under age 18	Percent under age 19	Percent under age 21	Total prisoners	Reference date
Arizona	0.2	a	8.0	3,326	1/1/80
California	a	a	5.2	21,260[b]	12/31/79
Florida	2.2	4.7	14.2	19,692	6/30/80
Massachusetts	0.4	1.5	8.4	2,754	1/1/80
New Jersey	2.2	a	12.7	5,505	8/22/80
New York	a	a	14.0	21,644	12/31/80
North Carolina	3.6	7.5	18.5	15,479	12/31/80
Pennsylvania	0.4	a	8.6	8,203	12/31/79
Virginia	0.8	2.3	10.0	8,521	6/30/80
Wisconsin	0.4	2.4	15.4	3,654	12/31/80

[a] Not available from published state reports.

[b] Includes only felons in Department of Corrections institutions (94 percent of the total institutional population of 22,632). Most of the other inmates (940, or 4 percent) are civilly committed narcotic addicts.

Sources: Ariz. Dept. of Corrections, 1980, Table I-20; Cal. Dept. of Corrections, 1980, p. 7 and p. 58; Fla. Dept. of Corrections, 1981, p. 52; Williams, 1980, p. 31; N.J. Dept. of Corrections, 1981, pp. 3, 5, and 7; N.Y. Div. of Criminal Justice Services, 1981, p. 308; N.C. Dept. of Correction, 1981, pp. 35-36; Pa. Bureau of Correction, 1980a, p. 26; Va. Dept. of Corrections, 1980a:51; Wisc. Dept. of Health and Social Services, 1981, p. 18.

Unfortunately, comparable age data for a single year are not available for New York, where the jurisdiction of the juvenile court is also restricted to offenders under age 16; however, data from a national survey of prisons indicate that 10.9 percent of New York's inmates were less than 18 years old on March 31, 1978 (Carlson, Evans, and Flanagan, 1980:121-122).

Another striking feature of Table 4 is the relative absence of young inmates from California's prison system -- only 5 percent are less than 21 years old. This phenomenon results from California's relatively unique procedures under which young adult offenders, convicted in criminal court, can be sentenced to the Youth Authority; these offenders do not appear in regular prisoner counts, such as those in the National Prisoner Statistics annual publication, Prisoners in State and Federal Institutions.

Of course, other states have special sentencing provisions for youthful offenders convicted in criminal courts, but the most common practice is for these offenders to serve time in facilities operated by the state's adult correctional agency when they are confined. For example, persons sentenced as youthful offenders comprised 7 percent of Georgia's prison population in midyear 1980*; in New York in 1979, youthful offender commitments to the adult system numbered 376 (N.Y. Dept. of Correctional Services, 1980:5), while youthful offender commitments to the juvenile system numbered only 65 (N.Y. Division for Youth, 1980:11).

*Unpublished tabulations supplied to authors by Georgia Department of Offender Rehabilitation, Office of Research and Evaluation.

The situation is quite different in California. On September 30, 1981, 5,781 Youth Authority wards were held in institutions. Of this population, 46 percent had been received from criminal rather than juvenile courts; 65 percent were 18 years old or older; and 11 percent were at least 21 years old (Cal. Dept. of the Youth Authority, 1981). We will look further at how variations in assigning people to confinement systems on the basis of age effects fraction measures, but first we will introduce another definitional boundary that differs across states and over time.

Allocations by Sentence

State prison systems are usually considered to consist of confinement facilities where offenders with maximum sentences of more than one year are sent. In fact, at yearend 1980, only 3 percent of the 304,759 prisoners in state institutions had sentences of a year or less or were unsentenced. But the percentages vary substantially across states: from zero up to 51 percent among the 46 states for which data were available (BJS, 1981a:2). Of the 46 states, there were eight that had short-sentence or unsentenced prisoners in large enough numbers to exceed 15 percent of their total prison populations. Six of the eight (Vermont, Rhode Island, Connecticut, Delaware, Alaska*, and Hawaii) have state-run combined prison and jail systems; the other two (Maine and North Dakota) have relatively miniscule prison populations.

*Alaska does have some locally run jails.

Most of the very large state prison systems (more than 10,000 inmates) reported no short-sentence or unsentenced prisoners at yearend 1980 (e.g., New York, Michigan, Texas) or a proportion of less than 5 percent (e.g., Georgia, Florida). But two states with large prison systems, California and North Carolina, also had relatively large numbers of short-sentence or unsentenced prisoners. In California, these prisoners were virtually all unsentenced, primarily narcotic addicts who had been civilly committed. In North Carolina, they were virtually all inmates with short sentences because that state sends offenders with sentences of more than 180 days to state facilities.

A closer look shows that some states not only limit state prison admissions to offenders with a sentence of more than one year, but also allow offenders with sentences of up to 18 or 24 months to serve their time in local facilities. For example, only 0.1 percent of Pennsylvania's 7,095 state prisoners at yearend 1977 had maximum sentences of less than one year (Pa. Bureau of Correction, 1978:12), while 18 percent of its 6,406 inmates in local facilties on February 15, 1978 were serving sentences of more than one year (BJS, 1981c:23). In contrast, 9 percent of North Carolina's 14,087 state prisoners at yearend 1977 had sentences of less than one year (N.C. Dept. of Correction, 1978), but only 1 percent of its 2,766 county inmates on February 15, 1978 were serving sentences of more than one year (BJS, 1981d:49).

Changes over time in how prisoners with different types of sentences are allocated among institutions also occur. For example,

states that had been confining sizable numbers of misdemeanants in their prison systems have been forced to change that practice in response to overcrowded conditions at state institutions. Virginia and Illinois are two states in which this has occurred. In Virginia, the number of misdemeanants confined in the adult state prisons declined steadily through the 1970s to zero at year-end 1979; at the same time, the number of felons confined in the prisons increased by 69 percent between 1970 and 1979. Evidently, Virginia did not simply accommodate an increasingly large share of its misdemeanants in local jails; at least from August 1978 to July 1981, the proportion of convicted misdemeanants among Virginia's jail population has remained relatively constant at about 20 percent (Va. Council on Criminal Justice, 1981: 47-56).

Table 5 brings together age and sentence factors discussed in this section and the preceding section. Fraction A numerators consist of the prisoners under state jurisdiction at yearend 1979. In the second column (Fraction B), only state prisoners with sentences of more than a year are in the numerators. For the numerators of Fraction C, the total number of jail inmates from the most recent National Prisoner Statistics (February 1978) were added to the 1979 yearend count of prisoners under state jurisdiction.* Finally, the Fraction D numerators were constructed by

*Caution must be exercised in summing NPS counts of jail inmates and prisoners under state jurisdiction because, in some states, relatively large numbers of state prisoners are housed in local jails to alleviate prison overcrowding. In most instances, these prisoners are counted both as prisoners under state jurisdiction and as jail inmates in National Prisoner Statistics data sets. Furthermore, the numbers of "overflow" prisoners can change rapidly over several years within a given state. For example, in Georgia their numbers jumped from zero to 1,729 from yearend 1977 to yearend 1981, while during the same period in Maryland, their numbers declined from 921 to 71 (BJS, 1980a:17, and BJS, 1982:3).

TABLE 5

Four Fraction Measures[a] and State Rankings (in Parentheses) on Each Fraction Measure, Eleven Selected States

State	Fraction A	Fraction B	Fraction C[b]	Fraction D[b]
California	96 (32)	90 (31)	206 (16)	269 (13)
Connecticut	131 (17)	69 (39)	131 (35)	150 (36)
Delaware	238 (3)	183 (8)	238 (11)	273 (12)
Florida	207 (5)	203 (4)	311 (3)	340 (4)
Georgia	221 (4)	213 (3)	373 (1)	399 (1)
New Jersey	79 (38)[c]	75 (35)	132 (34)	157 (35)
New York	121 (21)	121 (20)	183 (21)	210 (22)
North Carolina	243 (2)	229 (1)[f]	290 (6)	311 (6)
Pennsylvania	66 (44)[d]	66 (40)[d]	120 (38)	148 (37)
Rhode Island	79 (38)[c]	60 (44)	79 (48)	101 (48)
Texas	186 (8)[e]	186 (6)[e]	264 (9)	286 (10)

[a] All fractions are multiplied by 100,000. The denominator for every fraction measure is the 1980 Census count of the total resident population of the state. The Fraction A numerator is the National Prisoner Statistics count of the number of prisoners under state jurisdiction at yearend 1979. The numerator for Fraction B is from the same source but consists of prisoners serving sentences of one year or more. The Fraction C numerator sums prisoners under state jurisdiction at yearend 1979 and the NPS count of total jail inmates on Feb. 15, 1978. The Fraction D numerator sums prisoners under state jurisdiction, jail inmates, and the 1979 yearend count of residents of public and private juvenile facilities.

[b] Prisoners housed in local jails because of overcrowding in state facilities at yearend 1979 are deducted from jail population figures to avoid double-counting, except in New Jersey where such inmates were not included in the 1979 yearend count of prisoners under state jurisdiction.

[c] Three-way tie: Nebraska, New Jersey, and Rhode Island

[d] Tie with Utah

[e] Tie with Maryland

[f] Tie with South Carolina

adding 1979 yearend counts of the residents of public and private juvenile facilities to the Fraction C numerators. Total 1980 state populations are used in all of the denominators; all fractions have been multiplied by 100,000. In the parentheses, next to each fraction, is the ranking of the state, among all 50 states, on that fraction measure.

The eleven states in Table 5 were selected to illustrate the effects of the definitional boundaries we have been discussing on cross-sectional fraction measures. As we move from Fraction A to Fraction D -- from a narrow measure of the fraction in prison to an inclusive measure of the fraction incarcerated -- between-state differences in how inmates are allocated to various confinement facilities within the justice system become moot. For individual states, the amount of difference between Fractions A and D depends on how inclusive the initial fraction in prison (Fraction A) is. Connecticut, Delaware, and Rhode Island, for example, have relatively small differences between Fraction A and Fraction D because their integrated, state-run prison/jail systems result in virtually all adult inmates being counted in their Fraction A numerators; this is also why these same states show relatively large differences between Fraction A and Fraction B, in which unsentenced and short-sentence state inmates are dropped from the numerator. North Carolina also shows relatively little change from Fraction A to Fraction D; a very large proportion of all inmates are counted in North Carolina's Fraction A because of the low maximum age for juvenile court jurisdiction (as reflected in the relatively small

increase from Fraction C to Fraction D) and the practice of sending offenders with short sentences (over 180 days) to state rather than local facilities (as reflected in the relatively large decrease from Fraction A to Fraction B).

Of the eleven states in Table 5, Pennsylvania and California show the greatest relative increases from Fraction A to Fraction D. Pennsylvania, as we noted earlier, uses county facilities to house inmates with sentences of up to several years, and these inmates do not enter the numerator until Fraction C.

But California's fractions, and its rankings among the states on the various fractions, undergo the most striking changes in Table 5: The inclusive fraction incarcerated measure (Fraction D) for California is 2.8 times as large as the narrow fraction in prison measure (Fraction A), and California moves up from a ranking of 32nd among the states on Fraction A to a ranking of 13th on Fraction D. We have already discussed the California practice of housing a substantial number of young adult offenders in Youth Authority facilities -- a population of inmates that is not counted in Table 5 until Fraction D. In addition, California uses jail (often with probation) as a sentence in a large number of felony arrest dispositions, and jail sentences have increased substantially, relative to other sentences, during the 1970s (Cal. Dept. of Justice, 1980a: 11-14).

The effects of not taking into account the differing definitional boundaries that determine how people are allocated among the institutions of states' justice systems are apparent from

examining the fraction measures of three very large states: California, New York, and Texas. As shown in Table 5, using the traditional "rate of imprisonment" (Fraction A), California's fraction in prison is 21 percent lower than New York's and 48 percent lower than Texas'. But when jails and juvenile facilities are taken into account by a fraction incarcerated (Fraction D), the fraction in California is 28 percent higher than the fraction in New York and only 6 percent lower than the fraction in Texas.

In our earlier examination of base populations for fraction measures, it was found that taking the age and sex distributions of state populations into account had virtually no effect on cross-sectional variability in fraction measures. However, taking definitional boundaries of numerators into account does have an effect; the full 50-state distributions of the fraction measures illustrated in Table 5 do differ in variability. The measure with the least inclusive numerator, Fraction B shows the most cross-sectional variation (coefficient of relative variation = .465), and the commonly used "rate of imprisonment, "Fraction A, has only slightly less (CRV=.455). Incorporation of jail inmates into the numerator of Fraction C decreases the variability (CRV=.430), and adding residents of juvenile facilities to form Fraction D produces even less variability (CRV=.374). Evidently, some of the commonality among states in the use of confinement is masked when narrowly defined fraction measures are employed as indicators of the use of confinement.

Other Definitional Boundaries

Allocations of inmates among justice system confinement facilities on the basis of age and sentence length are currently the most important definitional boundary factors to consider in analyses of fractions of the population under penal confinement. However, one can take a much broader view and ask questions about all of the people who are placed in institutions because they are defined as undesirable, unwanted, or unable to care for themselves. Thus, using the terminology presented in Chapter 1, one can ask about the fraction institutionalized.

The number of institutionalized persons is very large. At the time of the 1970 Census, somewhat more than 2.1 million people were classified as residing in institutions.* Of these, only about 400,000 were located in prisons, jails, and juvenile training schools and detention homes. The majority (more than 1.5 million) were in homes for the aged and dependent (primarily elderly), mental hospitals, and homes and schools for the mentally handicapped.

Summing the residents of all these institutions to form a numerator, and using the total 1970 population as a denominator, the

*The Census Bureau's definition of "institutions" incorporates: (a) correctional institutions (prisons, reformatories, local jails and workhouses), (b) mental hospitals, (c) residential treatment centers, (d) tuberculosis hospitals, (e) chronic disease hospitals (except tuberculosis and mental), (f) homes for the aged and dependent, (g) homes and schools for the mentally handicapped, (h) homes and schools for the physically handicapped, (i) homes for dependent and neglected children, (j) homes for unwed mothers, (k) public and private training schools for delinquents, (l) detention homes for delinquents (see U.S. Bureau of the Census, 1973:x-xiii).

fraction institutionalized for the U.S. as a whole was about 1 percent (1046 per 100,000) in 1970. The 1970 fractions institutionalized in the 50 states show much less variability than even the inclusive fractions incarcerated (Fraction D) used earlier in Table 5. Recall that the coefficient of relative variation for Fraction D, across the 50 states, was .374. In contrast, the 1970 fractions institutionalized have a CRV of only .247 (mean = 1022.48 per 100,000; standard deviation = 252.32).* Again we find that some of the variability among states in confinement practices is reduced when a more inclusive measure of the fraction of the population in confinement is used.

Returning our attention to the justice system, it is important to remember that physical confinement is not the only mode of correctional system control available to the states. Probation and parole are complements of incarceration, and some of the differences among states (or changes over time) in the use of incarceration may be due to differences (or changes) in the use of community supervision.

Parole data for most of the states have been available for some time through the Uniform Parole Reports (UPR), and similar probation data have become available recently through the National

*The difference between these CRVs is not due to the fact that the fractions incarcerated were computed with data from the late 1970s (with a 1980 base population) while the fractions institutionalized use 1970 data. When fractions incarcerated for the 50 states are computed with 1970 data (numerator = categories a, k, and l from preceding footnote; denominator = total 1970 resident population), the CRV is .391.

Probation Reports (NPR); both of these data sets deal only with adults. A very comprehensive measure of the fraction of the adult population under correctional supervision is formed by summing, for the numerator, the numbers of adult jail inmates, prisoners under state jurisdiction, adult probationers, and adults on conditional release (either parole or mandatory supervised release). In the present case, the jail counts refer to February 1978, while the prison, probation, and supervised release components of the numerator refer to yearend 1979; the denominator is the 1980 resident population between the ages of 20 and 44. Table 6 presents the 12 highest and 12 lowest ranking states on the fraction of adults under correctional supervision and on two other measures: the fraction of adults incarcerated (numerator = prison population plus adult jail population; denominator = resident population 20-44 years old) and the fraction of supervised adults who are not incarcerated (parole and supervised release populations divided by total adults under correctional supervision). In this case, the 12 highest and lowest states represent the top and bottom quartiles of the rankings because some data are missing for two of the 50 states.

Examination of the rank-order changes in Table 6 indicates that the decision to use the fraction under correctional supervision rather than the fraction incarcerated (or vice-versa) can have a major impact on the results of one's analysis. Massachusetts, for example, ranks 42nd on the fraction incarcerated, but 1st on the fraction under correctional supervision because fully

TABLE 6

Upper and Lower Quartiles[a] of State Rankings
On Two Fraction Measures and on the Proportion
of the Correctional Population Not in Confinement

	Fraction of adults incarcerated[b]	Fraction of adults under correctional supervision[c]	Fraction of adults under correctional supervision who are not incarcerated
Upper Quartile of States	1. Georgia	1. Massachusetts	1. Massachusetts
	2. Florida	2. Maryland	2. Rhode Island
	3. South Carolina	3. Texas	3. Vermont
	4. Louisiana	4. Georgia	4. Connecticut
	5. North Carolina	5. North Carolina	5. South Dakota
	6. Nevada	6. South Carolina	6. Hawaii
	7. Alabama	7. Delaware	7. Utah
	8. Maryland	8. Florida	8. Illinois
	9. Texas	9. Oklahoma	9. Maryland
	10. Mississippi	10. Nevada	10. Nebraska
	11. Tennessee	11. California	11. New Jersey
	12. Delaware	12. Connecticut	12. Pennsylvania
Lower Quartile of States	37. Nebraska	37. Tennessee	37. West Virginia
	38. Wisconsin	38. Hawaii	38. Florida
	39. Utah	39. Iowa	39. Michigan
	40. Maine	40. New Mexico	40. Alabama
	41. Iowa	41. Wyoming	41. Virginia
	42. Massachusetts	42. Maine	42. New Mexico
	43. Minnesota	43. Arkansas	43. Minnesota
	44. Vermont	44. West Virginia	44. Louisiana
	45. Rhode Island	45. New Hampshire	45. Tennessee
	46. Hawaii	46. Ohio	46. Mississippi
	47. New Hampshire	47. Minnesota	47. Arkansas
	48. North Dakota	48. North Dakota	48. Ohio

[a] Based on data for 48 states; complete data not available for Alaska and Kansas.

[b] Sum of prisoners under state jurisdiction at yearend 1979 and adult jail inmates on Feb. 15, 1978 divided by resident state population, 20-44 years old.

[c] Sum of prisoners under state jurisdiction at yearend 1979, adult jail inmates on Feb. 15, 1978, adult probationers at yearend 1979, and adult conditional releases (parole and mandatory supervised release) at yearend 1979 divided by resident state population, 20-44 years old. Probation and conditional release data from NCCD (1981: 22) and BJS (1980b:32-33), respectively.

95 percent of the adults under correctional supervision in Massachusetts are on probation or parole; similarly, Rhode Island -- with 88 percent of its adult correctional population outside institutions -- moves from 45th to 17th* on the two measures. At the other extreme are Ohio and Arkansas, in which the percentages of the correctional populations on probation or parole are 39 percent and 43 percent, respectively. Ohio is ranked 22nd on the fraction incarcerated,* but drops to 46th on the fraction under correctional supervision; the comparable rankings for Arkansas are 16th* and 43rd.

There is a strong tendency for states with high fractions incarcerated to have relatively low proportions of their correctional populations on probation or parole (Spearman's rank-order correlation between the two sets of measures for 48 states is - .545). However, there are exceptions. For example, North Carolina and North Dakota, which differ substantially on fractions incarcerated and fractions under correctional supervision, have very similar proportions of their correction populations under community supervision: 72 percent and 75 percent, respectively.

What is perhaps most important is that the positioning of the states, vis-a-vis each other, changes so much when one moves from the fraction incarcerated to the fraction under correctional supervision that the associations of these measures with other variables are affected. Table 7 gives some examples. Both measures show

*Rankings in the middle two quartiles are not displayed in Table 6.

TABLE 7

Bivariate Relationships (Pearson's r) of Fraction of Adults Incarcerated and Fraction of Adults Under Correctional Supervision with Selected Independent Variables[a]

Independent Variable	Bivariate Relationship With: Fraction of Adults Incarcerated[b]	Fraction of Adults Under Correctional Supervision[c]
Adult Part I Arrest Rate (1979)	.62	.53
Unemployment Rate (1979)	.14	−.04
Per Capita Income (1979)	−.09	.29
Percent of Population Residing in Metropolitan Areas (1979)	.11	.41
Percent Change in Population (1970-80)	.42	.09
Percent Black in Population (1980)	.76	.28

[a] Based on 45 states with data on all variables.

[b] See definition in footnote b, Table 6.

[c] See definition in footnote c, Table 6.

moderate to strong bivariate associations with adult arrest rates for Part I UCR crimes (homicide, rape, robbery, aggrevated assault, burglary, larceny, and vehicle theft), and both show virtually no association with 1979 state unemployment rates. Per capita income in 1979 shows a slight positive association with the fraction under correctional supervision, but the coefficient for the fraction incarcerated is near zero. For the next two independent variables, associations with the two fraction measures show a near-perfect reversal: The fraction under correctional supervision has a moderately positive association with the percent of state population residing in metropolitan areas, but its association with the percentage change in state population between 1970 and 1980 is not substantial; the opposite pattern occurs with the fraction incarcerated. Finally, both fraction measures are associated positively with the percent of the state population that is black, but the association is much stronger for the fraction incarcerated than for the fraction under correctional supervision.

We make no attempt here to untangle the substantive meaning of the differential associations in Table 7. They are presented to illustrate that measures of the fraction of the population under some form of social control are not interchangeable. Different measures have different patterns of association with potential explanatory variables. Therefore, it is important that the fraction measure chosen be justified beforehand in terms of the purposes and theoretical framework of the research.

Variations Within Groups

The preceding section has shown the necessity of being aware of the differing formal rules and procedures that determine which people are assigned to which social control facilities -- the fraction in prison in one jurisdiction (or at one point in time) may incorporate, in its numerator, inmates who are found in the jail or juvenile facility population in some other jurisdiction (or at some other point in time). These definitional boundaries, as we have been calling them, determine the inclusiveness of the inmate count in the numerator of a given fraction measure. By determining the inclusiveness of the count, the definitional boundaries also affect the distribution of certain characteristics among the inmates counted; for example, Table 4 illustrated the differing age distributions of inmates in several state prison systems.

The first portion of this section discusses one variable characteristic of inmate populations that is determined partially by definitional boundaries and partially by other factors: the distribution of offense types. The second portion looks at some dimensions of variability in the conditions under which inmates are held. In both cases, we focus primarily on prisons because type-of-crime and condition-of-confinement data are more widely available for prisons than for other institutions.

Types of Crimes

Table 8 presents data for 13 states on the most serious offense of prisoners in state institutions, with the offenses grouped into four broad categories: person (primarily homicide, robbery, assault,

TABLE 8

Offense Distributions of State Prison Inmates
At Two Points in Time, Thirteen Selected States

State and Dates	Percent[a] of inmates whose most serious crime was classified as: Person	Property	Drug	Other	Not Reported
Arizona: 6/30/73	50	32	14	4	0
: 1/1/80	54	29	15	2	0
California: 6/30/73	55	24	17	4	0
: 12/31/79[b]	63	24	9	4	0
Florida: 6/30/73	48	28	7	5	12
: 6/30/80	49	36	7	8	0
Georgia: 6/30/73	56	37	5	2	0
: 6/18/80	50	39	5	5	0
Kansas: 6/30/73	49	42	6	3	0
: 6/30/79	54	40	3	3	0
Massachusetts: 6/30/73	72	14	11	3	0
: 1/1/80	80	13	4	3	0
Minnesota: 6/30/73	49	40	0	6	4
7/1/80	56	34	3	7	0
New York: 6/30/73	64	18	12	6	0
: 12/31/80	66	12[c]	9	13[d]	0
North Carolina: 6/30/73	40	44	2	13	0
: 12/31/80	46	41	5	7	1
Oregon: 6/30/73	41	37	9	13	0
: 9/30/80	56	36	3	5	0
Pennsylvania: 6/30/73	54	23	8	7	8
: 12/31/79	65	25	4	6	0
Texas: 6/30/73	40	35	12	13	0
: 12/31/80	45	43	8	3	1
Wisconsin: 6/30/73	44	46	4	6	0
: 12/31/80	53	40	4	3	0

[a]Percents may not sum to 100 because of rounding.

[b]Includes only felons; excludes felons in reception centers and active parolees in Controlled Substance Treatment Units.

[c]Includes only burglary.

[d]Includes youthful offenders (3%).

SOURCES: All 1973 data from LEAA, 1976. Other data: Ariz. State Dept. of Corrections, 1980: Table 1-22; Calif. Dept. of Corrections, 1980:55; Fla. Dept. of Corrections, 1981: 58-59; Ga. Dept. of Offender Rehabilitation, Statistics Unit (unpublished printouts); Kan. Dept. of Corrections, 1979:24,29; Williams, 1980:12-16; Minn. Dept. of Corrections, 1980; N.Y. Div. of Criminal Justice Services, 1981:302; N.C. Dept. of Correction, 1981:29; Ore. Dept. of Human Resources, Corrections Div. (unpublished documents); Pa. Bureau of Correction, 1980a:29; Texas Dept. of Corrections, 1981:38-39; Wisc. Dept. of Health and Social Services, 1981a:13-14.

and rape), property (primarily burglary, larceny, and vehicle theft), drug, and other. The data for each state refer to two points in time. The first is June 30, 1973, utilizing data gathered in the 1973 Census of Prisoners in State Correctional Facilities. The second point in time is anywhere from six years to seven and one-half years later, depending on the data from individual state reports.

Focusing first on the offense distributions at the most recent points in time, it appears that most of the cross-sectional variation can be accounted for by differing crime patterns among the states and by the definitional boundaries we discussed in the last section. For example, the states with relatively high proportions of inmates convicted of crimes against persons - Massachusetts, New York, Pennsylvania, and California -- are all heavily urbanized states, and the primary component of that offense category is robbery, a predominantly urban crime. When robberies are removed from the crimes against persons category for the most recent time periods, the proportions of inmates in that category become much less variable: 11 of the states fall within the relatively narrow range of 28 to 36 percent, while two of the states - Massachusetts and Pennsylvania -- retain relatively high proportions (47 and 42 percent, respectively).

However, in both Massachusetts and Pennsylvania, the offense distribution among state prisoners might be affected by one of the definitional boundaries discussed earlier, namely, allocation to either state or local facilities on the basis of sentence length.

Both states permit sentences of more than one year to be served in local jails, penitentiaries, or houses of correction. In Massachusetts, the practice is particularly prevalent. On February 15, 1978, there were 754 inmates serving sentences of more than one year in the local facilities of Massachusetts (BJS, 1981c:11), while about six weeks earlier, 2,712 inmates were serving sentences of more than one year in the state's prison system (LEAA, 1979a:11). Combining these two figures, we find that 22 percent of Massachusetts inmates with sentences of more than one year were serving their sentences in local facilities. A comparable calculation from the same sources for Pennsylvania yields a figure of 15 percent. But for Florida and Texas -- states in Table 8 with relatively low proportions of prison inmates convicted of offenses against persons -- the figures are only 1 percent and 3 percent, respectively (see BJS, 1981d and LEAA, 1979a).

It seems reasonable to conclude that holding a relatively large proportion of inmates sentenced to more than a year in local facilities will tend to inflate the proportion of the prison population that consists of inmates who have been convicted of crimes against the person. This conclusion is based on the assumption that those serving time in local facilities have been convicted of generally less serious crimes than those serving time in prisons. Unfortunately, we do not have the offense breakdown of inmates serving more than one year in the local facilities of Massachusetts and Pennsylvania. But indirect evidence to support the assumption can be derived from Pennsylvania admissions data for state prisons

and county facilities. During 1979, the local facilities received 4,486 inmates who had been sentenced to one year or more. Of those, 16 percent had been convicted of serious crimes against the person: homicide/manslaughter, rape, aggravated assault, or robbery (Pa. Bureau of Correction, 1980b:13-14). In contrast, 41 percent of the 3,178 state prison admissions during the same year had been convicted of similar crimes (Pa. Bureau of Correction, 1980a:19).

The mix of offense types in the numerators of fractions in prison varies among states at a given point in time because of differences in factors such as crime patterns, definitional boundaries, law enforcement/prosecutorial emphasis on certain types of crimes. Similar factors can create changes over time in the offense mix of the numerators within a single jurisdiction. Table 9 displays California data that illustrate changes over time. The upper portion of the table shows the distribution, within four crime categories, of male felons in California prisons at yearend, from 1965 through 1980. Most striking is the virtually constant increase, at least until 1977, in the proportion of prisoners who had been convicted of violent crimes.* This increase has been complemented by general declines in the proportions of property offenders and "other" offenders.

As we discussed earlier, the adult prison population in California is not comparable to other states because of the relatively

*The general pattern of increase is present among each of the crime types in the violent category: homicide, rape, assault and robbery.

TABLE 9

Offense Distributions of Male Felony Prisoners and Male Institutionalized Youth Authority Wards in California, 1965-1980

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Male Felons in Calif. Prisons (Dec. 31 each year)																
Person	41	42	43	44	46	48	52	53	53	54	58	59	61	61	61	61
Property	33	32	30	30	28	26	23	22	23	23	20	21	20	22	24	24
Drug	16	16	16	15	15	15	16	16	16	16	15	14[b]	12	11	9	7
Other	10	10	10	11	11	10	9	9	8	7	7	7	7	5	7	8
Male Youth Authority Wards in Institutions (June 30 each year)																
Person	22	22	21	24	26	26	30	36	39	43	46	50	52	50	50	52
Property	45	43	42	38	36	32	32	31	33	34	33	35	35	38	40	36
Drug	4	6	8	12	13	15	16	13	8	6	6	3[b]	2	2	2	2
Other[a]	29	29	29	27	25	26	22	20	20	17	15	13	10[c]	9	9	10

[a] Includes Welfare and Institution Code commitments, which consist primarily of status offenders prior to 1977.
[b] Possession of small amounts of marijuana changed from a felony to a misdemeanor on January 1, 1976.
[c] Commitment of status offenders prohibited on January 1, 1977.

SOURCES: Calif. Dept. of Corrections, California Prisoners (annual).
Calif. Dept. of the Youth Authority, 1974 and 1980.

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large number of persons 18 or older who serve their sentences in Youth Authority institutions. Given this feature of the confinement system in California, one might suspect that the growing proportion of offenders convicted of violent crimes in state prisons is a result of housing increasingly larger shares of nonviolent offenders in Youth Authority facilties. The lower portion of Table 9 -- which shows the offense distribution of Youth Authority wards in institutions on June 30 each year from 1965 through 1980 -- indicates that this is not the case. As was true with the California prison populations, the proportions of violent offenders in Youth Authority institutions show a steady rise until they stabilize at about 50 percent in the late 1970s. Patterns for the three remaining categories of offenders are somewhat different for Youth Authority institutions than for prisons. For example, the decline in the "other" category is much more dramatic among Youth Authority wards, primarily because of the movement toward deinstitutionalization of juvenile status offenders which began to have effect in the early 1970s.

The sources of the changes illustrated in Table 9 are difficult to determine. One possibility is that the mix of offenses among arrestees has changed. In fact, the proportion of California adult felony arrests consisting of crimes against persons rose from 19 percent in 1970 to 25 percent in 1979 -- but the proportion consisting of crimes against property also rose, from 35 to 41 percent. Those increases coincided with a decline in felony marijuana arrests,

from 21 percent of all adult felony arrests in 1970 to only 6 percent in 1979 (Cal. Dept. of Justice, 1980a:6).

Another possibility is that the changing offense distribution in California's prisons and Youth Authority institutions is due to changes in the allocations of different types of convicted offenders to state and local facilities. Unfortunately, we do not have the information about the offenses of inmates serving time in California jails. Another relevant data set -- dispositions of felony offenders by California courts -- has comparability problems across the time period covered in Table 9. Dispositional data also moves us from the realm of fraction measures into the realm of chance measures, which is the topic of Chapter IV.

Whatever the reasons for the changing offense distribution among California prison and Youth Authority inmates, it is apparent from Table 9 that the fraction in prison and Youth Authority institutions in 1965 differed qualitatively from the fraction in 1980. The fraction of the total state population in prison and Youth Authority institutions was substantially lower in 1965 than in 1980,* but the numerator of the fraction measure in the later year was comprised of a much larger proportion of inmates convicted of offenses against the person than was the fraction in the earlier year. Actually, the pattern makes intuitive sense: As a state

*In fact, the absolute numbers of male felons in California prisons and male Youth Authority wards in institutions was higher in 1965 than in 1980.

restricts the fraction of its population held in prison, one would expect the restrictions to affect offenders convicted of property, drug, and "other" crimes more than offenders convicted of crimes against the person.

From a measurement perspective, the differences (across jurisdictions and over time in the same jurisdiction) in the offense distributions within the numerators of fraction measures, as illustrated in Tables 8 and 9, add to the difficulty of making comparisons among fraction measures. For example, the fraction of the total state population at yearend 1979 was the same (51) in Massachusetts and Minnesota (BJS, 1981b:14), but Table 8 indicates that the numerator for Massachusetts contained a far greater proportion of person offenders (80 percent) than did the numerator for Minnesota (56 percent). Should the fraction measures still be treated as equal? We will not attempt to answer this question here, reserving our discussion of the meaning of fraction measures for the final section of this chapter.

Conditions of Confinement

Most cross-sectional and longitudinal analyses of fractions of the population in confinement have focused on differences, or changes, in the size of the fraction (e.g., Berk, et al., 1981; Garofalo, 1980; Blumstein and Moitra, 1979; Nagel, 1977). There has also been an increasing amount of interest in the comparative size of race-specific fraction measures over time and among jurisdictions (e.g., Christianson and Dehais, 1980; Dunbaugh, 1979). But attempts to analyze the offense mix among inmates who make up

the numerators of fraction measures have been rare (e.g., Cahalan, 1979), and systematic study of variability in the conditions of confinement has begun only recently.

The conditions of confinement have received a great deal of attention, particularly in the courts. As of early 1982, individual prisons -- and in some cases, entire prison systems -- in 28 states were operating under court orders to change specified conditions; suits were pending in eight additional states (Criminal Justice Newsletter, March 15, 1982, pp. 2-5). To those cases must be added the less publicized court orders under which dozens of local jails are operating. Overcrowding is a primary factor in most of the court cases, but it is usually treated as an aggravating element in a "totality of conditions" which includes violence, lack of programs, inadequate medical care, unsanitary facilities, and so forth.

The depressing conditions in individual state and local facilities are chronicled in numerous court findings, newspaper articles, and periodic reports from governmental agencies and private groups, but the systematic, comparative study of conditions of confinement is in its infancy. A major step in this direction is represented by the multi-year study conducted by Abt Associates for the National Institute of Justice. Included in that study was a survey of state correctional institutions that gathered a variety of information pertinent to the conditions of confinement. The survey was conducted in March 1978, so its data apply to the same time period as the

Census of Jails conducted by the Census Bureau for the Bureau of Justice Statistics in February 1978.

The data sets show that some rather aged facilities are used as prisons and jails in the criminal justice system. About one of every five adult state facilities was constructed prior to 1925; one of every 20 was constructed prior to 1875. Similarly, one-quarter of the local facilities were built before 1925, about one in twenty before 1875 (derived from Mullen and Smith, 1980:23 and 260).

But these overall figures do not reveal the full picture. The older state prisons, for example, hold a major share of the prisoner population. Although the 101 state facilities constructed prior to 1925 represent only 19 percent of the total state facilities, they held almost 40 percent of the state prison inmates in March 1978. This is because the very large state institutions -- those with average daily populations of 1,000 or more -- tend to be very old: about half were constructed prior to 1925. Furthermore, the old prisons are concentrated in certain states. There are 15 states in which at least half of the adult state correctional facilities were constructed before 1925.* These states account for 15 percent of the 521 state facilities in the nation, but they contain 44 percent of the pre-1925 facilities (figures derived from Mullen and Smith, 1980:23 and 243-245).

Unlike prisons, local facilities do not show a concentration of inmates in older facilities; while 25 percent of all local

*Illinois, Iowa, Kansas, Maine, Minnesota, Mississippi, Nebraska, New Hampsire, New Jersey, North Dakota, Pennsylvania, South Dakota, Texas, Wisconsin, and Wyoming.

facilities were constructed before 1925, only 17 percent of all jail inmates were being held in those facilities in February 1978. However, very old jails are found mostly in a handful of states. Seven states, with 19 percent of the 3,493 local facilities, contain 65 percent of the facilities built prior to 1875.* One of these states alone (Pennsylvania) has 19 percent of the pre-1875 jails, even though only about 2 percent of the nation's jails are located within its borders (figures derived from Mullen and Smith, 1980:259-260).

The study by Abt Associates also delved into the issues of capacity and crowding in prisons and jails. They developed criteria for crowding of confinement units (cells or dormitories) based on density (the square feet of space per inmate) and occupancy (the number of inmates sharing a confinement unit). To constitute crowding, the researchers required the simultaneous existence of both high density and multiple occupancy. In their words: "a crowded inmate is one who lives in a high-density multiple occupancy confinement unit -- i.e., a cell or dormitory shared with one or more inmates with less than 60 square feet of floor space per inmate" (Mullen and Smith, 1980:70). Note that, under this standard, inmates who do not share their cells are not crowded, no matter how tiny the cells are.

Using their conservative criteria, the researchers were able to use the March 1978 Survey of State and Federal Adult Correctional Facilities and the February 1978 Jail Census to categorize each state on the percentage of inmates living in crowded confinement

*Illinois, Indiana, Kentucky, Massachusetts, Missouri, Ohio and Pennsylvania.

units. The data are displayed in Table 10. What is most obvious from the data is the great variability in crowding among states. For example, Table 10 shows that more than 70 percent of the inmates in five state correctional systems reside in crowded confinement units, while in 13 states, the figure is 10 percent or less. Similarly, more than 70 percent of the inmates in the local facilities of five states are crowded, but for four other states, local facility crowding effects 20 percent or less of the inmates.

In addition to crowding, the Abt researchers examined inmate-to-staff ratios and expenditures per inmate as indicators of the conditions of confinement. Again, they found wide variability among the states. For example, ratios of inmates to service personnel (counselors, doctors, vocational instructors, etc.) in adult state institutions varied from a low of 6:1 in Minnesota to a high of 60:1 in Texas; ratios of inmates to custodial staff showed a more compressed, but still substantial, range (2:1 to 12:1). In local facilities, the ratios of inmates to custodial staff ranged from about 3:1 in four states (Colorado, Massachusetts, New Hampshire, and New York) to more than 10:1 in three states (Alabama, Mississippi and Wyoming). The ratios of inmates to service staff in local facilities varied enormously across states, extending from less than 30:1 in Kansas, Massachusetts, New York, New Jersey, and Pennsylvania to more than 300:1 in Arkansas, Iowa, Montana, Mississippi, and South Dakota (see Mullen and Smith, 1980: Ch. 4 and App. D).

TABLE 10

Categorization of States by Percentages of Inmates Held in Crowded Confinement Units in State and Local Adult Correctional Facilities[a]

Percent Crowded	State Facilities	Local Facilities[b]
81% - 90%	Texas, North Carolina	Maryland
71% - 80%	Mississippi, South Carolina, Florida	Alabama, Oregon, Arizona, Texas
61% - 70%	New Mexico, Louisiana, Tennessee, Georgia, Illinois	Georgia, Washington, Florida, Tennessee
51% - 60%	Arkansas, Nebraska, Vermont, Alaska	Louisiana, Utah, California, Nevada Nebraska
41% - 50%	Oklahoma, Maryland, Missouri, Nevada, Ohio, Alabama, Washington	Oklahoma, Mississippi, North Carolina, Indiana, Illinois, Arkansas, Idaho, New Mexico, West Virginia, Kansas, Colorado
31% - 40%	Oregon	Michigan, Montana, Wisconsin, Missouri, Alaska, Kentucky, Iowa, Wyoming, South Carolina
21% - 30%	Idaho, Utah, Virginia, Hawaii, Delaware, Wyoming, Kansas	South Dakota, Pennsylvania, Ohio, Virginia, Minnesota, North Dakota, New Hampshire
11% - 20%	New York, Arizona, Kentucky, Montana, New Jersey, Maine, South Dakota, Michigan	New Jersey, Maine, Massachusetts, New York
10% or less	Connecticut, Rhode Island, New Hampshire, California, Indiana, Massachusetts, Wisconsin, Colorado, Pennsylvania, West Virginia, Minnesota, Iowa, North Dakota	

[a] Derived from Mullen and Smith, 1981, p. 75 and p. 79. Data pertain to March 31, 1978 (state facilities) and February 15, 1978 (local facilities).

[b] Five states (Connecticut, Delaware, Hawaii, Rhode Island, and Vermont) have no local facilities.

In addition to the state-by-state variation of inmate/staff ratios in state and local facilities, Mullen and Smith report substantial variability among facilities within the same state. This is especially true for inmate/service staff ratios in local facilities. Many small jails have no full-time service staff; however, even among major jails in the same state, ratios can vary tremendously. For example, in California, the San Francisco City-County jail system had an average daily population of 1,158 at the time of the February 1978 jail survey, and its cross-bay neighbor, the Alameda County system, had an average daily population of 1,598. The two jail systems had similar inmate/custodial staff ratios (5.7:1 for San Francisco, 5.1:1 for Alameda), but the inmate/service staff ratios were 14.1 in San Francisco and 400:1 in Alameda County (Mullen and Smith, 1980: App. D).

Mullen and Smith also produced estimates of direct expenditures per inmate in state prison systems for fiscal year 1977. Again, there was wide variation among the states: from expenditure levels of less than $3,000 per inmate in Georgia, South Carolina, and Texas to expenditures exceeding $14,000 per inmate in Alaska, Massachusetts, and New Hampshire (Mullen and Smith, 1980:118).

Not surprisingly, the researchers uncovered associations among their indicators of conditions of confinement, at least in their data pertaining to prisons: States with higher fractions of their populations in prison are more likely to have crowded conditions, high inmate/staff ratios, and low expenditures per inmate.

In an unpublished paper, Greenfeld (1981a) drew on data from the same March 1978 survey of state prisons that was used by Mullen and Smith. He selected nine variables as indicators of prison conditions: (1) proportion of inmates with less than 60 square feet living space, (2) proportion of inmates in confinement units housing two or more people, (3) direct expenditures per inmate, (4) proportion of inmates in special housing units for protective purposes, (5) proportion of inmates in disciplinary segregation, (6) average number of hours confined to housing unit per day per inmate, (7) proportion of inmates in maximum security classification, (8) proportion of total staff classified as service providers, and (9) ratio of service staff to inmates.

From the scores of the 559 adult state correctional institutions surveyed, Greenfeld computed a national mean for each of the nine indicators. He then selected eight states -- one from each of the major Census Bureau geographic regions -- containing a total of 53 institutions. Each institution was given a score on each of the nine indicators, based on the number of standard deviation units above or below the national mean for the indicator. A positive value was assigned to a score if it reflected a condition of confinement that was more favorable than the national mean (e.g., fewer hours confined per day per inmate); a negative value was assigned if the score reflected a condition less favorable than the national mean (e.g., a higher percentage of inmates held in disciplinary segregation). A score for each of the eight states on each of the nine indicators was computed by averaging the scores

of the prisons within the state.* The state scores on the nine indicators are displayed in Table 11, along with total index scores derived by summing across the rows of the table.

It is apparent from Table 11 that there is a wide range in overall conditions of confinement, even among this small group of eight states. Furthermore, examination of the individual indicators reveals that the patterns of conditions vary across states. Even states with predominantly negative scores on the indicators have positive aspects; Florida, for example, comes out relatively well in terms of its level of service personnel, even though its scores on most of the indicators are negative. On the other hand, the states with predominantly positive scores still have negative features; for example, the Minnesota prison system is relatively spacious, well funded, and well staffed with service personnel, but it holds a relatively large proportion of its inmates in disciplinary segregation.

Greenfeld continued his analysis by selecting, from each of the eight states, one major prison** and making the same kinds of comparisons that are illustrated in Table 11. In general the overall scores of the eight prisons, vis-a-vis each other, were similar to the distribution of the scores of the eight states, vis-a-vis each other, in Table 11. The major exception was Walpole in

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*For Florida and North Carolina, only the five largest institutions in each state were used.

**Raiford (Fla.) Stateville (Ill.), Walpole (Mass.), Stillwater (Miss.), New Mexico Penitentiary, North Carolina Central Prison, Oregon State Penitentiary, and Graterford (Pa.).

TABLE 11

Average Scores on Conditions of Confinement Indicators[a]
For Prisons in Eight Selected States

State	Less than 60 sq. ft.	Multiple occupancy	Expenditures per inmate	Protective custody	Disciplinary Segregation	Hours confined	Maximum security classification	Ratio: service staff/ total staff	Ratio: service staff/ inmates	Total[b]
Florida[c]	-1.2	-1.1	-0.7	-0.7	-0.9	-4.4	1.4	2.1	0.5	-5.0
Illinois	-1.2	-0.6	0	-6.2	-7.1	-5.3	1.0	-0.9	-0.3	-20.6
Massachusetts	2.1	2.4	2.1	-0.5	-1.2	-2.1	0.5	-1.5	1.1	2.9
Minnesota	4.0	2.5	1.5	0.1	-4.0	-0.3	0.1	4.1	2.0	10.0
New Mexico	-1.4	-1.3	-0.4	-14.4	-7.1	-9.0	2.8	0	-1.0	-31.8
North Carolina[c]	-1.9	-0.9	-0.4	0.7	0.4	-4.7	1.7	0.3	-0.6	-5.4
Oregon	-1.8	0.5	-0.3	2.4	0.8	-2.9	1.6	2.4	0.8	3.5
Pennsylvania	3.3	2.7	1.0	2.4	-1.6	-0.1	d	3.0	1.4	12.1

[a] Scores for individual indicators are stated in terms of deviations from national means. Positive and negative scores do not necessarily reflect deviations above or below the national mean; a negative score indicates a deviation toward a condition of confinement that is less favorable than the national mean, while a positive score indicates a deviation toward a more favorable condition. See text for definitions of indicators and description of how scores were derived.

[b] Summations across rows.

[c] Includes only the five largest state correctional institutions in the state.

[d] Data not available.

SOURCE: Greenfeld, 1981:10.

in Massachusetts. Taken together, the prisons in Massachusetts produced a somewhat positive rating in Table 11, but Walpole itself produced a fairly high negative total score, primarily because of small cells, a relatively high proportion of inmates in disciplinary segregation, and the confinement of inmates for a relatively large number of hours per day (Greenfeld, 1981a:14).

Finally, Greenfeld made a comparison of the scores among five large prisons in a single state, Florida.* Again, variability on total scores and on individual indicator scores were apparent (Greenfeld, 1981a:16). This aspect of his analysis provides quantitative support to what is common knowledge among "experienced" prisoners in states that have a number of prisons: The prison to which one is assigned plays an important role in determining how difficult it will be to serve time.

Within-state variation in conditions of confinement is not a characteristic unique to prisons. This can be illustrated with examples of the local jails in two states. The first example pertains to the unequal distribution of crowded conditions among the local facilities in a state. Crowding in New Jersey's jails has been increasing since late in 1980. The growth of the problem is at least partially attributable to the growth in the numbers of state-sentenced inmates who are awaiting transfers to state facilities; these numbers increased from 75 in October 1980 to 1,527 in May 1982 (N.J. Dept. of Corrections, 1980-1982). But the

*The prisons were Apalachee, Avon Park, Raiford, Starke, and Sumter.

crowding is much more severe at some county facilities than at others. On March 16, 1982, for example, four county facilities had populations of less than their rated capacities, and in another eight facilities, populations were between 100 percent and 110 percent of rated capacities. Three county facilities, however held populations that were more than double their rated capacities (N.J. Admin. Office of the Courts, 1982).

The second example relates to overall conditions in local facilities, as indicated by noncompliance with state standards. In Illinois the Bureau of Detention Standards and Services (part of the state's Department of Corrections) sets minimum standards for the county jails and conducts periodic inspections to monitor compliance. The Bureau's report for fiscal year 1980 shows that the facilities in 15 counties (excluding Cook County) had average daily populations of more than 50 inmates during the fiscal year. Even this set of local facilities within a relatively restricted size range (average daily populations between 61 and 210), the Bureau's inspections turned up great variability in instances of noncompliance with standards: Three of the facilities had none or one, while five of them had 10 or more (Ill. Dept. of Corrections, 1980a:4-21).

The illustrations discussed in this section provide convincing evidence that conditions of confinement are highly variable. The conditions in prisons and jails, for which data are most readily available, vary across states, within states, and over time. This variability raises the issue of whether it is proper

to give equal weight to the people counted in the numerators of fraction measures. For example, if two states hold similar fractions of their total populations in prison, but the prisons in one state have substantially worse conditions (e.g., crowding, violence, lack of programs, etc.) than the prisons in the other state, should the two fractions be treated as equivalent? Any good researcher could predict our answer to this question: It depends on what the fractions are being used for -- on what meaning the user is trying to attach to the fractions. If the use of confinement is meant to reflect the punitiveness of sanctions, then it seems reasonable to develop an indicator that captures both the extensiveness of confinement and the conditions under which confinement occurs.

Before proceeding to the next chapter, we will sum up some of the points that have been raised about fraction measures.

Summary and Conclusions

In this chapter and in Chapter II we have examined a number of issues that pertain to the numerators and denominators of various fraction measures. What at first seems to be a relatively straight-forward concept -- the fraction of the population held in confinement at a given point in time -- turns out to be somewhat difficult to pin down with rigorous definitions and measures.

As shown in Chapter II, the overall measure of the fraction confined for an entire population really consists of a number of different fractions for subgroups of the population. Depending

on the range of facilities included in the definition of confinement -- e.g., prisons, jails, juvenile facilties, mental institutions -- the fractions for population subgroups can vary from zero to relatively high levels. Thus, when absolute levels of fraction measures are at issue, it is important to specify the base population carefully.

We also explored the issue of whether the use of entire populations rather than more narrowly defined subgroups as the denominators of fraction measures accounts for cross-jurisdictional and longitudinal variation in the traditionally used "rate of imprisonment." Sex distributions in base populations do not appear to have major effects. Although prison and jail populations are overwhelmingly male, differences among jurisdictions or changes over time in the sex distribution of resident populations are not sufficiently large to account for the relatively large variations in fraction measures.

When attention shifts to age distributions among resident populations, the effect depends on whether one uses cross-sectional or longitudinal data. Most of the people in prisons and jails fall into an age group which ranges from about 20 to 45. In recent years, there is not much cross-sectional variation in the proportions of states' resident populations in this age group. However, shifts over time do occur in the age distribution of the general population, and if one is examining the use of confinement over a decade or longer, these changes should be taken into account.

Racial distributions in base populations are strongly associated with traditional "rates of imprisonment," at least cross-sectionally, because in every state, the fraction of the black population held in prison is substantially higher than the fraction of the white population held in prison, and because the racial distributions among resident populations vary substantially across states. However, the amount of disparity between the fraction of blacks and the fraction of whites in prison also varies widely across states, so race-specific fraction measures show almost as much cross-sectional variability as traditional "rates of imprisonment" do. Unfortunately, we do not have reliable national data on the racial breakdown of prison populations over a long period of time, which would allow us to examine race-specific fractions in prison longitudinally.

In the present Chapter, the focus has been on the numerators of fraction measures. Upon deeper examination, it was found that the numerator of the traditional "rate of imprisonment" leaves much to be desired. Even if concern is restricted to the use of confinement by the justice system, the "rate of imprisonment" ignores differences among jurisdictions and changes over time in the laws and procedures under which offenders are allocated to prisons, jails, and juvenile facilities. Cross-sectionally, the variability of fraction measures among states decreases when more inclusive counts of people confined in justice system facilities are used in the numerators of the measures. Again, the lack of appropriate data

for suitably long periods of time makes it difficult to determine if similar results would be forthcoming from longitudinal analyses: Yearly counts of inmates in justice system facilities other than prisons are difficult to obtain. However, from various sources, there are indications that the allocations of justice system confinees among types of facilities do change over time; as examples, one notes declines in the numbers of misdemeanants held in prisons during the 1970s and the rise and decline during the 1960s and 1970s of the numbers of inmates held in special facilities for drug offenders.

Even when the basic person-counting problems pertaining to the numerators of fraction measures can be overcome, this chapter has shown that other issues will remain. For example, cross-jurisdictional differences and changes over time will occur in the offense distribution of inmates counted in the numerators and in the conditions under which the inmates are held.

The relevance of all of the measurement issues discussed in this and the preceding chapter to a given use of fraction measures by a researcher or policy analyst depends on what meaning the user attaches to the measures. Fraction measures are a bit ambiguous because they reflect several aspects of the use of confinement -- particularly admission rates (the chances of confinement) and the duration of confinement (average time served). At the same time, this is a strength of fraction measures: They summarize a number of processes relating to the use of confinement. As a comparative indicator of overall reliance on confinement (across jurisdictions

or over time) and of subjection to confinement (across population subgroups), the fraction measure is a useful tool. It is a rough indicator of several aspects of the use of confinement, such as the relative use of confinement versus non-confinement penalties and the liklihood that someone in the general population (or a population subgroup) will be confined during some period of time, although more precise indicators of these phenomena (chance and prevalence measures) are available.

Perhaps the greatest appeal of fraction measures is that they are so easy to construct. The data needed for basic fraction measures are much more readily available than are the data needed for the measures discussed in the remainder of this monograph. However, the simplicity of fraction measures is at least misleading. Problems such as definitional boundaries and additional factors such as the conditions of confinement have been discussed in this chapter, and when these are taken into consideration seriously, data availability becomes a more pressing problem.

Our attention now shifts to chance measures. But many of the issues that have been covered in the discussions of fraction measures will remain relevant, particularly those pertaining to the numerators of the measures.

CHAPTER IV

CHANCE MEASURES

In Chapter I, a chance measure was defined as the probability of being admitted to a confinement facility given that one is in a specified base population. Just as with fraction measures, chance measures can be used at different levels of generality, depending on the inclusiveness of the types of confinement facilities that are of interest -- i.e., the chance of institutionalization, the chance of incarceration, the chance of imprisonment. But the data needed to examine any chance measure fully are much more complex and less available than the data needed to explore a corresponding fraction measure, and it would require great amounts of time and money to assemble the data necessary for thorough cross-sectional and longitudinal analyses of the chance of being admitted to a wide range of confinement facilities. Therefore, even more so than in Chapters II and III, the focus in this chapter is on prisons (the chance of imprisonment) rather than on society's full set of confinement facilities. When prison admissions data can be combined with data on admissions to jails and/or juvenile facilities to illustrate some points, we will discuss the chance of incarceration. Of course, the conceptual and measurement issues that are highlighted through exploration of the chance of imprisonment apply generally to other chance measures.

This chapter begins with a section that conceptualizes the chance of imprisonment as a branching probability process and points out the applicability of what was said in Chapter III about the numerators of chance measures. Then, several sections of the chapter are devoted to cross-sectional and longitudinal examples of fraction measures. The chapter concludes with a discussion of the general meaning and utility of chance measures.

Chance Measures as Conditional Probabilities

The chance of imprisonment is basically a branching probability process that starts with the commission of a crime and goes on through arrest and other decision points to sentencing and admission to prison -- the familiar funnel process of the criminal justice system. To estimate these branching probabilities for a given jurisdiction, one would need the numbers of crimes, arrests, charges, prosecutions, convictions, sentences, and admissions to prison. Then: $p^{(Imp)} = p^{(Imp \mid Sent.\ to\ imp)} \cdot p^{(Sent.\ to\ imp \mid Conv)} \cdot p^{(Conv \mid Pros)}$ .... and so on, inserting as many conditional probabilities as available data allow, and finally multiplying by $p^{(Arr)}$, the unconditional probability of being arrested, or by $p^{(Crim)}$, the unconditional probability of committing a crime.

The complex, data-intensive nature of any examination of this branching process is readily apparent. The difficulties of trying to merge data on the chance of imprisonment process with comparable data on other processes (the chances of admissions to jails, juvenile facilities, mental institutions, and so forth) make

explorations of the chance of incarceration or the chance of institutionalization formidable tasks.

Even the branching process described above for the chance of imprisonment is limited because it applies only to offenders admitted to prison with a new conviction. There are other types of prison admissions -- for example, parole violators who are recommitted without a new conviction. Although admissions based on new convictions comprise the great majority of prison admissions, other types of admissions reach substantial numbers in some jurisdictions. For example, Wisconsin reported 2,043 admissions to its adult correctional institutions in 1980. Of these: 54 percent were first admissions on a new adult sentence; another 13 percent were admitted from community supervision, but with a new sentence; 26 percent were admitted from community supervision with no new sentence; the remaining 7 percent consisted primarily of people being held temporarily while awaiting revocation hearings (Wis. Div. of Corrections, 1981:4). Prison admissions stemming from different situations would be handled best by separate branching processes. This of course, adds to the complexity of the analysis.

Returning to the model described above for the chance of imprisonment by way of a new conviction, we emphasize the importance of examining the full chain of probabilities for a complete understanding of the chance of imprisonment. All of the probabilities are important because, jointly they determine the overall probability that a person in the general population will be admitted to

prison. However, it is necessary to specify just what part or parts of the branching process are being examined and for what purposes. Often this is unclear in published reports. For example, the California Department of Corrections (1980:1) notes that the 9,874 "felons received from court during 1979 was the highest ever received during any calendar year in the history of this Department.... This rate of 44.0 per 100,000 State population represents the highest commitment rate in the State's history."

From the statements in the California report, many readers probably infer that the record-breaking "commitment rate" was due to the courts sending a higher proportion of convicted offenders to prison -- in other words, that $p^{(Imp|Conv)}$, the conditional probability of imprisonment given conviction, has increased. This could very well be true, but it is not necessarily the whole truth; there may have been increases in crime rates, arrest rates, prosecution rates, and conviction rates that also helped to increase the chance of imprisonment for the total state population. A change in the chance of imprisonment for the total population does not tell us which of the intervening conditional probabilities has changed, and a change in one of the conditional probabilities will not translate necessarily into a corresponding change in the overall chance of imprisonment. Similarly, cross-sectional differences among jurisdictions in the overall chance of imprisonment could be due to differences in any one -- or any combination -- of

the conditional probabilities, and jurisdictions with very similar overall chances of imprisonment could differ substantially in several of the conditional probabilities that determine the overall chances.

It should be apparent by now that the ideal data for thorough analyses of the chance of imprisonment, or any chance measure, are those that trace the flow of individual cases through the criminal justice system -- e.g., the final outcome of all arrests made during a specific time period. We will look at some examples of data sets of this type later, particularly data from states that have reported results derived from Offender-Based Transaction Statistics (OBTS) systems. But these data systems are relatively new, so many of our illustrations rely on independent counts of decisions at various points in the criminal justice system to make estimates of conditional probabilities. Such estimates are less than ideal. For example, one can estimate the conditional probability of imprisonment given arrest, $p^{(Imp|Arr)}$, by dividing the number of prison admissions in 1979 by the number of arrests in 1979, knowing full well that, although a large proportion of the people admitted to prison in 1979 were arrested during the same year, some of them were arrested in 1978, or even earlier, and will not appear in the denominator of the measure. Furthermore, some of the cases that are in the denominator will not appear in the numerator: 1979 arrestees whose cases will not be disposed of until 1980 or later, when prosecution, sentencing, or other

practices may have changed. This lack of precision is a concession that must be made to less than perfect data.

Before turning to illustrations of chance measures, some general comments about the denominators and numerators of those measures are in order. The denominator -- the base population -- selected for any chance measure actually specifies a conditional probability. When the number of convictions, for example, is chosen as the denominator with a numerator of prison admissions, we are dealing with the conditional probability of imprisonment, given conviction. Even the chance of confinement for the total population is a conditional probability of being admitted to a confinement facility, given that one is in the population of the specified jurisdiction during the specified time period. Likewise, comparisons of the chances of confinement for different demographic subgroups of the population (e.g., age-, race-, or sex-specific chances of imprisonment) are comparisons of sets of conditional probabilities.

When the denominator of a chance measure consists of the resident population of a jurisdiction, or some demographic subgroup of the resident population, problems similar to those discussed in Chapter II arise. How, for example, do we deal with the fact that some nonresident transients are counted among offenders admitted to prison (the numerator) but that no resident transients are included in the resident population count (the denominator)? As noted in Chapter II, this monograph contains no definitive answer to the question and no satisfactory way to adjust the measurement.

However, as also noted in Chapter II, indications are that the problem is not severe enough to affect the analyses and conclusions in this monograph substantially. Of course, when the denominator being used is some count of criminal justice case decisions (e.g., the conditional probability of imprisonment given arrest) the problem disappears: Nonresident transients are counted among people arrested (or charged, or convicted, and so forth) just as residents are.

The issues pertaining to the numerators of fraction measures, discussed in Chapter III, are also relevant to the numerators of chance measures, at least when the measure deals directly with the probability of admission to confinement rather than with one of the intervening conditional probabilities in the branching process (such as the conditional probability of being formally charged given that one has been arrested). It is necessary to be aware of the definitional boundaries that vary among jurisdictions and over time. For example, when comparing the chances of imprisonment for the resident (or arrested, or convicted, etc.) populations of North Carolina, New York, Pennsylvania, and California, one must remember that: (a) state prisons in North Carolina admit a sizeable number of offenders with sentences of less than one year, (b) New York's relatively low cut-off age for juvenile court jurisdiction means that 16 and 17 year-old offenders are admitted to its state prison system, (c) some Pennsylvania offenders with sentences up to two years serve their time in local facilities rather than in state prisons, and (d) in California, a large proportion of 18 to 20

year-old offenders are committed to the State's Youth Authority and are not generally counted as prison admissions.

Variability in conditions of confinement, which was also discussed in Chapter III with respect to the numerators of fraction measures, is very relevant to the numerators of chance measures. For example, the conditional probabilities of imprisonment given conviction for a set of jurisdictions give us some indication of the relative severity of dispositions among the jurisdictions. But the conditional probabilities of imprisonment could be similar for two jurisdictions that have very dissimilar prison systems -- one being substantially more crowded, more violent, and so forth, than the other. In this situation, it is arguable that the chances of imprisonment should be weighted by the conditions of confinement in order to assess the relative severity of dispositions. The situation is even more complex because different facilities within the same jurisdiction can vary widely in their conditions of confinement, a point that was also illustrated in Chapter III. As Greenfeld (1981a:15) has noted: "To the extent that variation in the severity of the environment exists within a state, the issue of disparity in sentence severity would also exist."

Because these issues pertaining to denominators and numerators were examined at length during the discussions of fraction measures in Chapters II and III, there is no need to present a full analysis of how the same issues apply to chance measures. Instead, we can move directly to a national overview of the chance of imprisonment.

National Overview

Cross-Sectional Perspective

The National Prisoner Statistics program collects and disseminates annual state-by-state data on admissions of offenders with sentences of more than one year to adult correctional facilities. Systematic, comparable data for all of the states on admissions to other confinement facilities -- particularly jails -- are not readily available. Even less available are comprehensive state-level data that would permit estimations of the conditional probabilities between commission of a crime and admission to a confinement facility. However, annual arrest counts for each state are easily obtainable from the Federal Bureau of Investigation in the format used in the Uniform Crime Reports (i.e., Part I and Part II crimes). With these limitations, resident population, arrest, and state prison admissions data are used in this section.

Table 12 presents estimates of two chance of imprisonment measures for the states: the chance of imprisonment for the resi- population 18 to 39 years old and for Part I arrests. The 48 states for which data were available to construct the two chance measures are ranked on each measure. Before examining the substance of Table 12, some of the apparent limitations of the estimates it presents should be noted. First, in each chance measure, the numerator consists of the number of prisoners with sentences of more than one year admitted to state correctional institutions during 1979 (BJS, 1981:20). Thus, the counts are subject to some of

the problems related to definitional boundaries that were discussed earlier -- although the fact that some state systems admit offenders with sentences of less than one year is not a problem here.

Second, the denominators for the first set of measures -- the chance of imprisonment for the resident population 18 to 39 years old -- utilize 1980 census data, even though the numerators contain 1979 admissions data. The choice of 1980 population data was made because these data are based on a full census for an early date (April 1) in 1980. The 18 to 39 year-old base population differs from the 20 to 44 year-old base population used several times in Chapters II and III. This is because offenders entering a state correctional system during a given year tend to have a somewhat younger age distribution than prisoners present on a given day during the year, many of whom have entered in prior years and have aged in prison. Thus, it is appropriate to use a base population for chance measures that is somewhat younger than the base population for fraction measures.

Finally, the denominators for the second set of chance measures in Table 12 consist of adjusted* 1979 counts of arrests for Part I crimes -- criminal homicide, forcible rape, aggravated assault, robbery, burglary, larceny, and motor vehicle theft** -- as defined in the Uniform Crime Reporting system (see FBI, 1981:347-348).

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*Adjustments were necessary because of variability among states in the proportions of their populations covered by arrest data submitted to the UCR system. See footnote a, Table 2.

**Arson was added to Part I crimes in 1979, but is not included here.

Although these crimes do not exhaust the offenses for which people are admitted to prisons, the overwhelming majority of admittees are convicted of these crimes (and, most likely, an even greater majority of the admittees were arrested for these crimes initially); the only major category of admissions to most state prison systems that is not included among UCR Part I crimes is drug offenses. But there are other caveats concerning the estimate of the chance of imprisonment given arrest. It has been noted already that independent counts of arrests and admissions in the same year are less than perfect for chance measures because some arrestees will not be admitted until subsequent years, and some of the admittees will have been arested in prior years. In addition, both counts pertain to events rather than individuals; although the frequency of multiple admissions of the same person to a state prison during a given year is probably not great, multiple arrests of the same person during a given year are relatively common. However, this is not really a problem if the measure is conceptualized as an estimate of the chance that any given arrest will result in a prison admission, rather than an estimate of the chance that a specific arrestee (who may have multiple arrests during the time period) will be admitted to prison.

In Table 12 both chance measures reflect the number of prison admissions per 1,000 units in the base population (18 to 39 year-old residents for Chance A and Part I arrests for Chance B). Naturally, the arrest-based chance measures are much larger than the population-based chance measures. The highest figure in the Chance

TABLE 12

State Scores and Rankings (in Parentheses) on Two Chance of Imprisonment Measures

State	Chance Measure A[a]	Chance Measure B[b]
Alabama	2.10 (17)	126 (18)
Alaska	1.85 (23)	163 (7)
Arizona	2.03 (18)	122 (21)
Arkansas	2.97 (5)	167 (6)
California	1.76 (25)	78 (37)
Colorado	1.15 (38)	56 (45)
Connecticut	2.89 (8)	113 (25)[c]
Delaware	2.14 (15)	113 (25)[c]
Florida	2.90 (7)	121 (22)[c]
Georgia	2.93 (6)	130 (15)[c]
Hawaii	0.53 (48)	41 (48)
Idaho	1.96 (19)[c]	146 (12)
Illinois	1.66 (26)	85 (34)
Indiana	1.58 (27)	127 (17)
Iowa	1.20 (37)	107 (28)
Kansas	1.93 (21)	150 (11)
Kentucky	2.13 (16)	151 (10)
Louisiana	1.49 (31)	61 (43)
Maine	1.41 (34)	103 (29)
Maryland	3.34 (2)	179 (3)
Massachusetts	0.78 (46)	44 (47)
Michigan	1.96 (19)[c]	153 (9)
Minnesota	0.95 (41)	93 (31)
Mississippi	2.85 (9)	180 (2)
Missouri	1.56 (29)	64 (41)
Montana	1.39 (36)	88 (33)
Nebraska	0.96 (39)[c]	74 (38)
Nevada	3.08 (4)	125 (19)[c]
New Hampshire	0.63 (NA)	d (NA)
New Jersey	1.51 (30)	92 (32)

(continued)

TABLE 12 (cont.)

State	Chance Measure A[a]	Chance Measure B[b]
New Mexico	1.77 (24)	125 (19)[c]
New York	1.57 (28)	63 (42)
North Carolina	4.05 (1)	162 (8)
North Dakota	0.63 (47)	71 (39)
Ohio	2.17 (14)	172 (4)
Oklahoma	2.69 (10)	169 (5)
Oregon	2.49 (12)	134 (13)
Pennsylvania	0.88 (44)	66 (40)
Rhode Island	0.84 (45)	54 (46)
South Carolina	3.26 (3)	181 (1)
South Dakota	1.47 (32)	132 (14)
Tennessee	2.19 (13)	130 (15)[c]
Texas	2.53 (11)	121 (22)[c]
Utah	0.92 (42)	59 (44)
Vermont	1.37 (NA)	d (NA)
Virginia	1.88 (22)	118 (24)
Washington	1.45 (33)	108 (27)
West Virginia	0.89 (43)	80 (35)
Wisconsin	0.96 (39)[c]	79 (36)
Wyoming	1.40 (35)	101 (30)

[a] Number of offenders with sentences of more than one year admitted to state adult correctional facilities during 1979, divided by 1980 state population 18 to 39 years old, multiplied by 1,000.

[b] Number of offenders with sentences of more than one year admitted to state adult correctional facilities during 1979, divided by adjusted number of UCR Part I arrests during 1979, multiplied by 1,000. See footnote a in Table 2 for explanation of adjustment to arrest data.

[c] Tied ranking

[d] Arrest data not available for New Hampshire and Vermont, which have been excluded from the rankings on both measures.

A column represents about four prison admissions for every 1,000 residents 18 to 39 years old, while the highest figure in the Chance B column represents 181 admissions for every 1,000 Part I arrests.

Some substantial changes in state rankings are found when the two sets of chance measures are compared, but there does not appear to be a pattern to the changes in rankings. For example, among Southern states with relatively high prison populations, Florida, Georgia, North Carolina, and Texas rank substantially lower on the arrest-based measure than on the population-based measure, but Maryland and South Carolina remain relatively unchanged, and Mississippi's ranking is higher on the arrest-based measure. Similarly, when the rankings on Chance A are compared to the rankings on Chance B for the urban-industrial states of the Northeast and Midwest: Connecticut, Illinois, and New York show decreases in rankings; Indiana, Michigan, and Ohio show increases; and Massachusetts, New Jersey, and Pennsylvania show only minor changes. However, examples of states which have substantial rank changes should not obscure the fact that, overall, the rankings of the 48 states on the two measures are quite similar (Spearman's rho = 0.80).

Perhaps the most important aspect of Table 12 is the greater variability among the population-based chance measures than among the arrest-based measures. Using the 48 states for which both chance measures are computed, the coefficient of relative variation for the population-based chances of imprisonment is .439, while it

is .354 for the arrest-based chances. This implies that at least some of the cross-sectional variation among states in the chances of imprisonment for their 18 to 39 year-old populations is attributable to differences in their arrest rates.

Insofar as we can rely on our estimates of the chance of imprisonment given arrest (constructed with same-year counts of Part I arrests and offenders admitted to state prison with sentences of more than one year), Table 12 tells us that states do vary in this conditional probability that is derived from the branching process underlying the chance of imprisonment. However, this variability is not as great as the variability among the conditional probabilities of imprisonment given membership in the population of 18 to 39 year-old residents. It would be interesting to make cross-sectional comparisons of other conditional probabilities in the branching process -- such as the chances of imprisonment given formal charging or conviction. Unfortunately, the data needed to construct estimates of other conditional probabilities are not available for all states, or even a large number of states. Later, cross-sectional data that give a more detailed picture of the branching process for a few states will be presented, but now we turn to a national overview of the chance of imprisonment from a longitudinal perspective.

Longitudinal Perspective

Annual admissions data for state and federal prisons extend back to 1926. Unfortunately, like all national data systems that rely on voluntary reporting of information from states (and, in this case, individual institutions), the series suffers from variability in coverage over time and in adherence to standard definitions. Prisoner statistics have an additional handicap: Responsibility for their collection and dissemination has changed from one federal agency to another several times. The statistics were published by the Census Bureau from 1926 to 1946. After a lag of a few years, responsibility was lodged with the Federal Bureau of the Prisons in 1950. The Law Enforcement Assistance Administration took over in 1971, and the statistics are now produced by the Bureau of Justice Statistics. However, during most of the years, the Census Bureau has collected the data and performed the initial statistical analyses.

The 1926 to 1970 time-series of prisoners with sentences of more than one year received by state and federal correctional institutions was published in the Bicentenial Edition of Historical Statistics of the United States (U.S. Bureau of the Census, 1975: 420). According to the text describing the data series (pp. 411-412), adjustments were made to the 1939-1967 data to account for missing states; however, an earlier report from the U.S. Bureau of Prisons (1954:6) claims that 1939 figures could not be adjusted to make them comparable to later years. Therefore, 1940-1967 will be

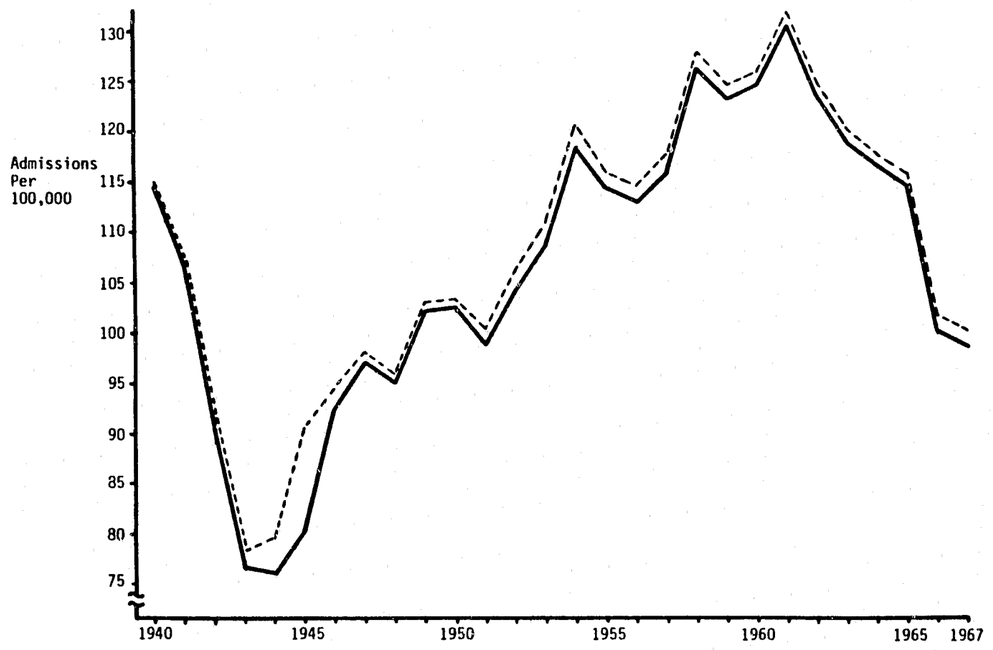
used for an initial national overview of changes in the chance of imprisonment.

The data are presented in Figure 7. The denominators for both of the chance measures in Figure 7 consist of estimates of the population in the 15 to 54 year-old group. This age range was chosen in order to utilize a single series of Census Bureau population estimates that covered all the years in Figure 7. Also note that the numerators of both measures consist of prisoners newly admitted from court with sentences of more than one year; this is not the only category of prison admissions, but it is by far the largest.

The solid line in Figure 7 represents chance measures with 15 to 54 year-olds from the total U.S. population used in the denominators. The dashed line represents a recomputation of the chance measures with the number of people serving in the Armed Forces overseas deducted from the denominator in each year (i.e., the resident population). The second line was added to illustrate two points. First, refining the base population so that it excludes people not in the country has virtually no effect on the overall trend in chance measures. This is particularly true for the post-World War II years, during which the U.S. has maintained a relatively large overseas military contingent on a permanent basis. For example, in 1953 (during the Korean War) there were about 1.3 million Armed Forces personnel overseas, and in 1967 (with a large combat contingent in Vietnam) the number was again close to 1.3 million; but

FIGURE 7

Chances of Imprisonment in State or Federal Correctional Institutions
Per 100,000 Persons 15-54 Years Old in Total U.S. Population (Solid Line)
And Per 100,000 Persons 15-54 Years Old in Resident U.S. Population (Dashed Line), 1940-1967



SOURCE: U.S. Bureau of the Census, 1975, pp. 8, 10, and 420.

between those years, the lowest number for overseas personnel was just barely under 700,000.

The second point illustrated by the two lines in Figure 7 pertains to the difficulty of using two different types of measurement in the numerator and denominator. The numerators and denominators of fraction measures are both counts of people at a given point in time. The chance measures represented in Figure 7 also use point-in-time counts in their denominators (population on July 1 of a given year), but they use counts of processes (admissions) that occurred during the course of an entire year in their numerators. The problem can be seen most clearly by comparing the two chance measures for 1945 that appear in Figure 7. That year shows the greatest disparity between the chance of imprisonment based on the total population and the chance based on a population count that excludes Armed Forces overseas (80.3 per 100,000 vs. 90.5 per 100,000). Also, from 1944 to 1945, the total population-based chance rose by 5 percent (76.0 to 80.3), while the second chance measure -- with overseas personnel excluded from the base -- rose by 14 percent (79.6 to 90.5). In truth, the population data, which pertain to July 1, produce an overestimate of the average number of people in the Armed Forces overseas for the full year, 1945. Hostilities ended in May and August in Europe and the Pacific, so there was a substantial influx of soldiers returning to the U.S. in late 1945.

Of course, this lack of correspondence between types of measurement in numerators and denominators will only make a major

difference if the phenomenon measured at one point in time (e.g., population) happens to be undergoing a major change during the time period covered by the other phenomenon (e.g., prison admissions during a year). Furthermore, most of the conditional probabilities than can be derived from chance of confinement branching processes have numerators and denominators that both consist of counts of events occurring during a time span (e.g., arrests, convictions, prison admissions during a year).

We pick up the national prison admissions data again in 1974, after it has been housed in the Law Enforcement Assistance Administration (LEAA). The 1970 report, the last published by the Bureau of the Prisons, contained the numbers of prisoners received from court for all but two states (U.S. Bureau of Prisons, 1973:5). The first full report produced by LEAA covered 1971 through 1973, but it contained no admissions data for 1971, and the admissions data for 1972 and 1973 were not categorized by type (LEAA, 1975).

Table 13 displays two measures of the national chance of imprisonment for the period 1974 to 1980. Numerators for both measures are prisoners with sentences of more than one year admitted to state and federal facilities as reported in the annual National Prisoner Statistics. The denominators for Chance A are numbers of 18 to 39 year-olds in the resident population of the U.S. in each year; the denominators for Chance B are total arrests for Part I crimes,* derived from the annual Uniform Crime Reports.

*Part I crimes are criminal homicide, forcible rape, aggravated assault, robbery, burglary, larceny, and motor vehicle theft. Arson, added by the UCR in 1979, is excluded here. Numbers of arrests have been adjusted to take variability in reporting areas into account.

TABLE 13

National Trends on Two Chance of Imprisonment Measures, 1974-1979

Year	Admissions[a]	Resident Population, 18-39 (in 1,000s)	Adjusted Number of Part I Arrests[b] (in 1,000s)	Chance A[c] (per 1,000)	Chance B[d] (per 1,000)
1974	108,895[f]	68,426	1,277	1.59	85
1975	129,573	70,634	1,287	1.83	101
1976	129,482	72,886	1,279	1.78	101
1977	128,050	75,075	1,273	1.71	101
1978[e]	126,121	77,220	1,360	1.63	93
1979	131,047	79,424	1,415	1.65	93
1980	142,122	81,575	1,521	1.74	93

[a]Prisoners with sentences of more than one year admitted from courts.

[b]Arrests of persons 18 years old or older. Starting in 1979, arson was added to Part I crimes; it has been excluded from the 1979 and 1980 totals. Adjustments were necessary because proportion of national population covered by arrest data submitted to UCR varies from year to year. Reported Part I arrests for each year were multiplied by ratio of total resident population to population covered by reported arrest data.

[c]Admissions divided by resident population, 18-39 (in 1,000s).

[d]Admissions divided by adjusted Part I arrests of persons 18 years old or older (in 1,000s).

[e]In 1977, National Prisoner Statistics changed from a custody to a jurisdiction count so that prisoners under state (or federal) jurisdiction would be counted regardless of where they were being held. Both counts were reported for 1977, and the custody count is used for that year; after 1977, only jurisdiction counts are available.

[f]Includes an estimate of 5,141 admissions for North Carolina added to the published total.

For the moment, we can ignore the problems of comparability from year to year that are present in the admissions data because we are more interested in comparing the year-to-year changes in Chance A with the year-to-year changes in Chance B. The two chance measures show some similarities in Table 13: Both increased from 1974 to 1975, and both decreased from 1977 to 1978. However, from 1975 to 1977, Chance A decreased, while Chance B remained constant. Over these three years, the numbers of admissions declined slightly, and the resident population of 18 to 39 year-olds increased -- thus the decrease in the chance of imprisonment for the 18-39 population subgroup. But during the same three years, the decline in admissions was matched by a decline in arrests -- thus the constant chance of imprisonment given arrest for a Part I crime.

During the period, 1978 to 1980, Chance A increased while Chance B remained constant. Increases are evident in admissions, resident population, and arrests during these years, but the base for Chance B (arrests) exhibits a relatively greater increase than the base for Chance A (resident population).

The time period covered in Table 13 is short, and the changes occurring in the chance measures are relatively small, but the differences between Chance A and Chance B from 1975 to 1977 and from 1978 to 1980 do help to demonstrate the effects of using different conditional probabilities as chance measures.

This national overview section has contained three examples of measuring the chance of confinement, one cross-sectional and two longitudinal. If the examples accomplish nothing else, they

should serve to make it clear that thorough analysis of the chance of confinement at the national level is exceedingly difficult. First, it is necessary to restrict one's attention to prison admissions; comprehensive admissions data are simply not available for other types of institutions, at least other types of justice system facilities. As we know from the earlier discussion of definitional boundaries, an exclusive focus on prisons can be misleading, especially when comparisons are made across jurisdictions.

Second, even if the definitional boundary variations which result in similarly situated offenders being assigned to different types of institutions are ignored, prison admissions data are very difficult to deal with for longitudinal analyses. The National Prisoner Statistics reporting system has been improved substantially in recent years; coverage of jurisdictions has become much more thorough, and the use of category definitions has become more standardized. But over its life span, the reporting system has been plagued by missing data (from individual institutions and whole states) and by variable adherence to category definitions by the reporting jurisdictions.

Finally, data about the intermediate steps in the justice system process are almost completely lacking on a nationwide basis, and this precludes a full analysis of important conditional probabilities that determine the overall chance of imprisonment (e.g., the probability of being sentenced to prison given conviction). Arrests are the only stage of the process about which we have reasonable

information, and national arrest data are utilized in Tables 12 and 13. But arrest data from the Uniform Crime Reports cannot be extended too far back in time. The system underwent a major change between 1951 and 1952; from 1952 through 1962, breakdowns of the data by age (and other variables) were not made for the national totals; the resident population covered by agencies reporting to the UCR did not attain 70 percent of the total U.S. resident population until the mid-1960s, and coverage did not pass 80 percent until 1975.

In order to present more complete analyses of the branching processes that underlie the chance of confinement, the remainder of this chapter will rely on more detailed data from a handful of individual states.

Cross-Sectional Illustrations from Selected States

During the 1970s, the Law Enforcement Assistance Administration stimulated the development of a new type of statistical system in criminal justice: Offender-Based Transaction Statistics (OBTS). The new statistical systems were designed to trace the flow of individual offenders through all stages of the criminal justice process, from arrest through final disposition (see Pope, 1975). The implementation and "debugging" of OBTS systems has been a painfully slow process -- not surprisingly, in light of the long tradition of independence among components of the criminal justice system and the tendency for each component to develop and maintain its own data base without regard to the data collected by other components.

In this section, OBTS data from four states are examined: Arkansas, California, New York, and Oregon. The presentation of these data is meant to provide examples of the conditional probabilities that comprise the branching process leading to incarceration. But it also illustrates that difficulties of working with OBTS-type data and making cross-jurisdictional comparisons of the conditional probabilities.

Table 14 displays data from two states. The branching processes for California and New York start with similar bases: adult felony arrests disposed of in 1979, regardless of when the arrest occurred.* However, a comparison of these two states on the first conditional probability shown in Table 14 (probability of prosecution or filing of a complaint given arrest) suggests that the bases are not precisely the same. Apparently, at least part of the reason for this conditional probability attaining 0.97 in New York and only 0.76 in California is that the California dispositions include cases released by law enforcement agencies before being referred to prosecutors while the New York dispositions do not. When law enforcement releases are excluded from the California data (n=18,326), the conditional probability of a complaint being filed, given arrest, rises from 0.76 to 0.85 (shown in parentheses in Table 14). This, however, is still lower than the 0.97 probability in New York.

The next set of entries (B) in Table 14 indicates that the conditional probability of conviction given prosecution, is higher

*In New York, for example, 98 percent of the arrests occurred in 1979 (63 percent), 1978 (31 percent), or 1977 (4 percent). See N.Y. State Div. of Criminal Justice Services, 1982:33.

TABLE 14

Branching Process Probabilities Derived from Offender-Based Transaction Statistics, California and New York

	California	New York
Base	Adult felony arrests disposed of in 1979	Adult felony arrests disposed of in 1979
Total number	170,980	106,220
Probability of:		
A. Prosecution/filing of complaint, given arrest	.756 (.847)[a]	.973
B. Conviction, given prosecution/filing of complaint	.755	.593
C. Conviction, given arrest	.571 (.640)[a]	.577
D. Prison or jail sentence, given conviction	.688	.407
E. Prison sentence, given conviction	.115	.133
F. Prison or jail sentence, given arrest	.393 (.440)[a]	.235
G. Prison sentence, given arrest	.066 (.074)[a]	.077

[a] Computed with 18,326 releases by law enforcement agencies deducted from total arrests.

SOURCES: Cal. Dept. of Justice, 1980b, p.40; N.Y. State Div. of Criminal Justice Services, 1982, p. 18.

in California (0.76) than in New York (0.59), perhaps reflecting more selective prosecution of cases in California, which can be inferred from the conditional probabilities of prosecution given arrest (A).

Combining (multiplying) the first two conditional probabilities to obtain the conditional probability of conviction given arrest (C, in Table 14), we find that California and New York have very similar results: 0.57 and 0.58, respectively. However, when law enforcement releases are deducted from the total number of arrests in California, the conditional probability of conviction given arrest is 0.64 in that state.

Moving down the probability chains in Table 14, we find that the conditional probability of receiving a sentence of incarceration -- prison* or jail -- given conviction, regardless of what court the conviction occurred in and whether the conviction was for a misdemeanor or a felony, is higher in California (0.69), than in New York (0.41). But the states are very similar on their conditional probabilities of a prison sentence given conviction: 0.12 in California and 0.13 in New York. The reason why the two states differ so much on the chance of <u>incarceration</u> given conviction but not on the chance of <u>imprisonment</u> given conviction is the very frequent use, in California, of a jail sentence in combination with probation. This disposition accounts for 46 percent of the sentences in California, while in New York, a jail term in combination with

*In Table 14, California prison sentences are defined to include sentences to prison (8,838), death (20), the Youth Authority (1,526), the California Rehabilitation Center (568), and state hospitals for mentally disordered sex offenders (269).

either probation or a fine accounts for only 2 percent of the sentences. Thus, while straight jail sentences are relatively more common in New York (25 percent of the sentences) than in California (12 percent), the very frequent use of combination dispositions by California courts results in over half (57 percent) of the sentences including <u>some</u> jail time, compared to a little more than one-quarter (27 percent) in New York.

The final two conditional probabilities in Table 14 show the chance of incarceration given arrest and the chance of imprisonment given arrest. Again, the data for California show the probabilities with and without law enforcement releases in the arrest denominator. Just as with the chances of incarceration and imprisonment given conviction discussed in the preceding paragraph, the chance of incarceration given arrest is higher in California (0.40 or 0.45) than in New York (0.23), while the chances of imprisonment given arrest are very similar (about 0.07).

The differences between California and New York in the chance of incarceration -- reflecting California's frequent use of combination probation-jail sentences -- illustrates one of the difficulties of comparing chance measure across jurisdictions. It is quite possible that, in California, the heavy reliance on combination sentences results in a large number of offenders with very short jail sentences (e.g., a few days) being included in the numerators of chance of incarceration measures. New York, in contrast uses combination sentences rarely, so chance of incarceration numerators are likely to contain offenders with longer jail sentences,

on average, than is the case in California. Yet, without refinement in our measurement abilities, we have little choice but to count each offender with at least some jail time in his or her sentence equally.

Actually, the issue of straight jail sentences vs. combination sentences is a subtle complication relative to other problems we face in comparing chance measures across jurisdictions. Even for California and New York, with two of the best developed OBTS systems in the country, problems abound. For example: (a) neither state claims to have attained full coverage of felony arrest dispositions -- California estimates 75 percent coverage, while New York estimates 80 percent; (b) both data sets are based on adult felony arrests, but adults are 18 and older in California and 16 and older in New York; (c) chances of incarceration or imprisonment differ by type of crime (more on this later), and the two states have different crime type mixes; (d) we estimate chances of incarceration or imprisonment from OBTS data on the basis on sentences, but all offenders sentenced to a confinement facility are not admitted to a confinement facility (more on this later, too), and the proportions actually admitted may vary across jurisdictions. Nevertheless, the data in Table 14 do illustrate the kinds of comparisons that will be possible when OBTS-type information become more widely available and more standardized.

As noted, the OBTS systems in California and New York are relatively advanced. Tables 15 and 16 present first stabs at statewide OBTS reporting for two states, Arkansas and Oregon.

The Arkansas data in Table 15 pertain to felony arrests made during 1974. The data were gathered through an intensive survey that identified arrestees and then tried to trace their progress through the independently maintained records of each component in the criminal justice system (See Arkansas Criminal Justice and Highway Safety Information Center, 1977). The process started with 10,462 arrests. There is some ambiguity about whether the survey was intended to cover only adult arrests, because 647 cases were referred to juvenile authorities at various stages in the process; these cases have been eliminated from the total arrests for Table 15. Also eliminated are 233 cases that were still pending when data were collected or that had been remanded from a circuit court to a lower court (and for which no other information was presented). In another 700 cases, police dispositions or adjudication outcomes were undetermined; these were deducted from total arrests. The final exclusion consists of 935 cases which were judged guilty, but for which sentencing information was not available. Thus, complete information is available for 7,947, or 76 percent, of the 10,462 arrests.

However, it is misleading to simply eliminate the 2,515 arrests for which complete information was not gathered, primarily because the 935 cases in which sentencing information was missing after adjudication of guilt included all of the cases that were found guilty in lower courts (750). Complete elimination of all 935 cases would understate the conditional probability of conviction given arrest or court filing (since all were convicted), and complete elimination of the 750 cases judged guilty in lower court would

TABLE 15

Branching Process Probabilities Derived from Offender-Based Transaction Statistics Survey, Arkansas

Base	7,947 felony arrests in 1974[a]	8,882 felony arrests in 1974[b]
Probability of:		
A. Prosecution/filing of complaint, given arrest	.797	.819
B. Conviction, given prosecution/filing of complaint	.590	.642
C. Conviction, given arrest	.470	.526
D. Prison or jail sentence, given conviction	c	c
E. Prison sentence, given conviction	.435	.348
F. Prison or jail sentence, given arrest	c	c
G. Prison sentence, given arrest	.204	.183

[a] Excludes all cases transferred to juvenile authorities, pending, or with missing outcome information; initial n = 10,462 arrests. See text for details.

[b] Includes 935 cases with missing sentencing information. See text for details.

[c] Chance of incarceration could not be computed because sentencing information was unavailable for all cases judged guilty in lower courts (n=750).

SOURCE: Arkansas Criminal Justice and Highway Safety Information Center, 1977.

overstate the chance of imprisonment given conviction (because, presumably, the lower courts cannot impose a sentence of imprisonment). Therefore, two sets of probabilities are shown for Arkansas in Table 15. The first set is derived from 7,947 arrests, eliminating all the cases discussed in the preceding paragraph. The second set is derived from 8,882 arrests (7,947 plus the 935 cases with missing sentencing information). No attempt is made to compute chances of incarceration because of the lack of sentencing information on the 750 cases found guilty in lower courts, which, presumably, contain most of the cases sentenced to jail.

The data for Arkansas in Table 15 help to illustrate the effects of handling cases with missing information in OBTS-type systems in different ways. As noted, the two columns of probabilities are based on arrest counts that are only slightly different, with the 935 cases found guilty but missing sentencing information excluded from the base for the first column but included in the base for the second column. Yet, this difference creates noticeable changes in some of the conditional probabilities. For example, the probability of conviction given arrest (C) in the second column is 12 percent higher than the corresponding figure in the first column, while the probability of receiving a prison sentence given conviction (E) is 20 percent lower in the second column than in the first column. Thus, there is even some amount of ambiguity about how to compute and interpret the figures from within one state; the problems are compounded when comparisons are made across states.

Earlier, it was noted that one of the difficulties of making cross-state comparisons of the chance of incarceration branching

processes for total felony arrests is that states may have different mixes of specific crime types within the total felony category. Of course, differential mixes of crime types will affect overall probabilities only if the branching process probabilities for the individual crime types differ from each other. Table 16 presents data showing that differences do exist among the branching probabilities characterizing several types of crime. The data are from two states (California and Oregon) and pertain to four types of crime (homicide, robbery, burglary and larceny/theft). These four crime types were chosen because they account for a major share of prison and jail admissions, yet they differ substantially in seriousness.

The data in Table 16 can be examined from a number of perspectives. First, the conditional probabilities across crime types for each state are compared, then between-state comparisons within crime type categories are made.

Of the four crime types in Table 16, robbery has the lowest conditional probability of prosecution given arrest in both states; in California, it is also the crime with the lowest conditional probability of conviction given prosecution. When the first two probabilities are multiplied, producing the conditional probability of conviction given arrest, the high attrition rate of robbery cases is evident: The resulting probability is 0.49 in California and 0.57 in Oregon. This attrition probably reflects the relatively great dependence of the prosecutors and courts on victim cooperation (i.e., providing identification, testimony) to sustain charges and convictions in robbery cases.

TABLE 16

Branching Process Probabilities for Four Crime Types, Derived from Offender-Based Transaction Statistics, California and Oregon[a]

Probability of	Homicide		Robbery		Burglary		Larceny/Theft	
	Cal. (1,813)[b]	Ore. (175)	Cal. (12,539)	Ore. (688)	Cal. (30,053)	Ore. (2,002)	Cal. (22,467)	Ore. (1,394)
A. Prosecution/filing of complaint, given arrest	.808	.769	.683	.688	.821	.777	.774	.736
B. Conviction, given prosecution/filing of complaint	.751	.871	.723	.826	.830	.804	.757	.742
C. Prison or jail sentence, given conviction[c]	.957	.696	.911	.734	.791	.563	.686	.493
D. Prison sentence, given conviction	.765	.634	.424	.609	.128	.403	.048	.289
E. Jail sentence, given conviction	.192	.062	.487	.125	.663	.160	.637	.204
F. Full suspension of sentence, given prison or jail sentence	d	.159	d	.096	d	.186	d	.276

[a] The California data refer to arrests disposed of during 1979; the Oregon data refer to arrests made in 1977.

[b] Numbers in parentheses indicate total numbers of arrests in the type of crime categories.

[c] California prison sentences are defined to include sentences to prison, death, the Youth Authority, the California Rehabilitation Center, and state hospitals for mentally disordered sex offenders. California jail sentences include sentences that combine jail and probation. For Oregon data, prison sentence is defined as confinement sentence of at least one year; jail sentence is defined as confinement sentence of less than one year.

[d] Information not available for California.

SOURCES: Cal. Dept. of Justice, 1980b, p. 40; Ore. Law Enforcement Council, 1981, pp. 9, 11, 21, 25, 29, 31, and 42.

Moving to the probabilities associated with sentencing in Table 16, the influence of crime seriousness becomes apparent. In both states, the conditional probability of receiving a prison sentence given conviction decreases substantially, moving across the row from homicide to robbery to burglary to larceny/theft. There is a corresponding tendency for the conditional probability of receiving a jail sentence given conviction to decrease (although the slightly higher probability associated with burglary than with larceny/theft is an exception to this trend).

Turning to comparisons between the two states in Table 16, somewhat different patterns within the type of crime categories are found. At the first two stages of the branching process, the conditional probabilities are higher in California than in Oregon for the two property crimes, burglary and larceny/theft. For robbery, which has elements of both theft and violence, the situation is reversed: The conditional probabilities associated with prosecution and conviction are higher in Oregon than in California. For the fourth crime, homicide, the pattern is mixed. The conditional probability of prosecution given arrest is higher in California than in Oregon, but the conditional probability of conviction given prosecution is higher in Oregon than in California. These differentials tend to cancel each other out; when the two probabilities are multiplied, the resulting conditional probability of conviction given arrest for homicide is 0.61 in California and 0.67 in Oregon.

Continuing with comparisons within the homicide category, we find that the conditional probability of a prison or jail sentence given conviction is much higher in California than in Oregon. California's greater reliance on sentences of confinement for homicide convictions is maintained even when the conditional probabilities of prison and jail sentences are examined separately.

One can speculate about the causes of the differences between California and Oregon in the branching probability processes characterizing homicide arrests. Perhaps homicide arrests in California contain a greater proportion of cases in which the victim and offender were strangers to each other than is true in Oregon. This would be consistent with California showing a higher prosecution rate, a lower conviction rate and a greater reliance on incarceration after conviction.

The conditional probabilities associated with sentencing for the other three crimes in Table 16 reflect something that was pointed out in the earlier discussion of Table 14: namely, California's heavy reliance on combination jail/probation sentences. For each of the crimes, the conditional probability of receiving a jail or prison sentence given conviction is higher in California than in Oregon. But examination of the components of the chances of incarceration given conviction reveals that California's dominance on this measure stems completly from conditional probabilities (given conviction) of receiving a sentence that includes some jail time -- probabilities that are anywhere from three to four

times greater in California than in Oregon. In fact, the conditional probabilities of receiving a prison sentence given conviction are higher in Oregon than in California for robbery, burglary, and larceny/theft.

A final aspect of Table 16 worthy of note pertains to the bottom row in the table. The Oregon report from which the figures in Table 16 were derived presents information about the proportion of sentences involving confinement that were fully or partially suspended (Oregon Law Enforcement Council, 1981:42); unfortunately, the same information was not contained in the OBTS reports for other states discussed in this chapter. If interest centers on the chance of going to prison or jail, rather than being sentenced to prison or jail, then information about sentence suspensions is critical. In the Oregon data, the probabilities of having one's sentence of incarceration fully suspended are inversely related to the chances of incarceration given conviction for the four crime types in Table 16; that is, the crimes with the highest probabilities of receiving a prison or jail sentence given conviction are least likely to receive a full suspension of sentence. Thus, the differences among these four crime types in the chance of incarceration are accentuated when sentence suspensions are taken into account -- the probabilities change from 0.70 to 0.59 for homicide,

from 0.73 to 0.66 for robbery, from 0.56 to 0.46 for burglary, and from 0.49 to 0.36 for larceny/theft.*

In this section, state-level OBTS data have been used to illustrate the branching probability processes associated with the chance of incarceration. However, the examples presented also shed light on the difficulties involved in using this type of data, especially when cross-jurisdictional comparisons are made. Published state reports using OBTS data do not define their arrest bases in the same way (e.g., arrests made during a given year vs. dispositions in a given year, or all felonies vs. "Part I" felonies). The definitions of specific types of crime may vary somewhat across jurisdictions, and even when the definitions are the same, there may be large cross-jurisdictional variations in the acts comprising particular crime types -- for example, robberies may be more likely to result in injury, or homicides may be committed proportionately more often by strangers in one state than in another. There are also a number of ways that states can deal with the problem of missing information in OBTS data sets, and as we have seen, different ways of treating missing information can produce different results.

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*The new probability for each crime type was computed by taking the complement of the probability of full suspension (1.000 minus the figure in row F of Table 16) and multiplying the result by the conditional probability of receiving a prison or jail sentence given conviction (Row C). This produces the conditional probability (given conviction) of receiving a prison or jail sentence that is not later suspended.

The final stage in the OBTS process -- the conditional probability of incarceration given conviction -- is difficult to compare across jurisdictions. Some jurisdictions may rely heavily on short periods of jail confinement in conjunction with other penalties, such as probation or fines, while in other jurisdictions, these short, "shock", dispositions may be relatively rare. The examples involving California in this chapter have illustrated how such sentencing variations confound cross-jurisdictional comparisons of the chance of incarceration.

It has also been noted that a prison or jail sentence given conviction is not really the final conditional probability in the chance of incarceration branching process. Some proportion of sentences to confinement are fully or partially suspended, and these proportions may vary from state to state. Even when a sentence is not formally suspended, it is not unusual for the convicted offender to be given credit against his/her sentence for time spent in pretrial confinement. When this credit equals or exceeds the sentence, the sentence of confinement does not result in a new admission to confinement. Suspensions of sentences and credits for time served are pieces of information that are not readily available on a systematic basis.

Finally, OBTS data, as they are presently construed, do not give a full picture of the chance of incarceration, even for states with highly developed OBTS systems. OBTS systems focus on adult felons; to include the full range of incarceration, it would be necessary to have comparable data on juveniles and on people

arrested for misdemeanors. In fact, OBTS data systems do not cover fully the chance of imprisonment for the general population or the chance of incarceration for felony arrestees. In the first instance, only prison admissions (actually, sentences) that result from arrests on new charges are included, and there are other routes to prison, particularly via parole revocation with no new conviction. In the second instance, felony arrestees often spend time in jail before adjudication -- frequently a considerable amount of time -- even when their cases result eventually in dismissal or acquittal, or when their sentences after conviction involve no confinement.

This discussion of the limitations of OBTS data for analyses of chances of incarceration should not be interpreted as criticism of OBTS in general; afterall, OBTS systems were not designed and implemented with the purpose of answering our questions about chances of incarceration. The OBTS data do permit examination of one of the major branching probability processes leading to penal confinement. The information presented in some state OBTS reports also allows analysis of how this branching process differs across subgroups; in this section, data on the probabilities for specific crime types have been presented, and in Chapter 6, race-specific probabilities will be looked at briefly.

It is important to remember that OBTS systems are relatively new. As they mature and as they converge toward common definitions and usages, cross-jurisdictional comparisons of the branching probability processes leading to incarceration will be more tenable,

and it will be possible to examine changes in the probabilities over time. Longitudinal analysis of the chance of confinement is the topic of the next section in this chapter.

Longitudinal Illustrations from Selected States

There are two basic ways to construct a longitudinal data set that will allow an examination of changes in the branching probabilities associated with the chance of incarceration for a given jurisdiction. The first possibility is to utilize independently produced counts of cases at various justice system decision points and try to tie them together. The limitations of such "non-transactional" data are readily apparent; for example, because of processing lags, cases disposed of by the courts in a given year probably include arrests made during several prior years. Perhaps the most important limitation is the lack of standardization in reporting categories and definitions. For example: Arrests may be reported in terms of Part I crimes, and court dispositions may be reported in terms of total felonies; one component may base its case counts on charges, while another may base counts on individuals; one component may exclude cases with missing information, while another places such cases in an undefined "other" category. Even without extending the list of examples, it should be apparent that the problems involved in constructing a suitable longitudinal data set from independent case counts of the various justice system components make analyses of such data sets tenuous. Nevertheless, in in this section, this type of data will be assembled and presented

for one state -- Illinois -- in order to illustrate the difficulties and shortcomings involved.

The second way to construct a longitudinal data set is to utilize OBTS-type data. However, "transactional" data sets are relatively new, and only a few years of data are available for most jurisdictions that have OBTS systems. California developed an OBTS system relatively early, and prior to the implementation of OBTS, the state had been publishing a similar set of statistics of high quality. Therefore, information from California reports will be used to illustrate the longitudinal analysis of the chance of imprisonment with transactional data.

Illustration with Non-Transactional Data

Table 17 presents branching probability estimates, in the form of ratios derived from non-transactional Illinois data for 1973 through 1980 (see Ill. Dept. of Corrections, 1982b). Actually, the middle two columns of Table 17 represent true conditional probabilities because they are based on data about the flow of a set of cases, which were initially charged as felonies, through the state's supreme courts.

The first column of ratios in Table 17 utilizes Part I arrests in the numerators and court dispositions of cases charged as felonies in the denominators. In addition to the time-lage issue that affects non-transactional data, there are a number of problems with these ratios. First, the arrests pertain to Part I offenses, all of which are not felonies, and the dispositions refer to felonies, all of which are not Part I offenses. Reports prepared by the

TABLE 17

Estimates of Branching Process Probabilities
Derived from Non-Transactional Illinois Data, 1973-1980

Year	Ratios of: Court dispositions of felony charges to Part I arrests	Convictions to court dispositions of felony charges	Sentences of imprisonment or death to convictions	Total prison admissions to convictions
1973	.215	.400	.400	.435
1974	.256 (.393)[a]	.443	.364	.335
1975	.295 (.446)	.468	.373	.347
1976	.322 (.493)	.485	.407	.347
1977	.326 (.539)	.531	.389	.343
1978	.319 (.521)	.545	.400	.354
1979	.342 (.567)	.538	.378	.376
1980	.368	.523	.383	.359

[a]Probabilities in parenthesis were computed with estimated numbers of adult felony arrests, rather than Part I arrests, in their denominators. See text for explanation.

SOURCE: Ill. Dept. of Corrections, 1982b.

Illinois' Statistical Analysis Center (Block and Klemundt, 1981; Block, 1979) show that there are great disparities between counts of Part I crimes and total felonies in the state, with Part I crimes being more frequent. For example, from 1972 through 1977, the ratio of felonies to Part I crimes in police statistics for the state varied slightly between 0.61 and 0.64 (Block, 1979: Table 1). The major source of the disparity is probably in the larceny category; many larcenies are misdemeanors in Illinois, yet larcenies comprise a very large proportion of Part I Illinois crimes (e.g., 58 percent in 1980).

A second major problem with the first column of ratios in Table 17 is that the denominators (Part I arrests) include arrests of adults and juveniles, while the numerators pertain almost exclusively to adults (only a small number of juveniles are prosecuted in adult courts). According to 1975 Illinois data (Block, 1979: Table 4), the police made 40,383 felony arrests in which the arrestee was held for court action; 34,564 (only 436 of which were juveniles) went to adult court, and 5,819 went to juvenile court.

Total (adult and juvenile) Part I arrests were used as denominators for the first column of ratios in Table 17 because information about Part I arrests was readily available in the same report that contained the information on felony charges, convictions, sentences, and prison admissions for Table 17 (Ill. Dept. of Corrections, 1982b). As noted in Chapter I, the approach of this monograph is to illustrate measurement issues with data that is easily obtainable by others. The main problem with comparing

Illinois arrest and court data is that neither can be transformed to the same unit of count as the other (felonies or Part I crimes) using published materials.

The Illinois Statistical Analysis Center has devised a method for recategorizing crimes known and arrest data into felony and misdemeanor classes (see Block and Klemundt, 1981; Block, 1979). This method requires a non-published breakdown of crimes or arrests into the 227 categories used by the Illinois Department of Law Enforcement. Even then, some of the 227 categories contain offenses that can be either felonies or misdemeanors, depending on the specific circumstances of the event (e.g., first offense vs. subsequent offense). Nevertheless, computer printouts of Illinois arrests, broken down into the 227 cagegories and classified as adult and juvenile, were obtained for the years 1974 to 1979. Transformations were made according to the method described by the Statistical Analysis Center (Block and Klemundt, 1981: App. B) to isolate annual counts of adult felony arrests. The results of using these estimates of the numbers of adult felony arrests as denominators in computing the probability of court disposition given arrest are shown in parentheses in the first column of Table 17.

Of course, the probabilities in parentheses are higher than the probabilities that use Part I arrests in their denominators because there are far more Part I arrests than there are adult felony arrests. But the patterns displayed by the two sets of

probabilities are similar: a general increase through the period covered, interrupted by a slight decrease from 1977 to 1978.

The difficulties experienced in trying to make Illinois arrests comparable to court dispositions illustrate one of the major problems that plague analyses of the chance of imprisonment when only non-transactional data are available: the tendency of individual components to define and categorize their data in ways that are inconsistent with the definitions and categories of other system components. Fortunately, in the example used, patterns of change in the probability of court disposition given arrest were not affected strongly, even though the absolute levels of the probabilities depended greatly on which set of arrest data was used in the denominators.

As noted earlier, the middle two columns in Table 17 are based on transactional data from Illinois courts, so the ratios do reflect conditional probabilities. There was a steady increase in the conditional probability of conviction given court disposition of a felony charge from 1973 to 1978. This was followed by a slight downturn in the probabilities during 1979 and 1980. Nevertheless, the conditional probability of conviction given felony charge disposition was about 30 percent higher in 1980 than in 1973 (increasing from 0.40 to 0.52).

On the other hand, the third column of ratios in Table 17 indicates that the conditional probability of receiving a prison or death sentence given conviction in an adult felony court fluctuated within a relatively narrow range during the eight-year

period. An alternative indicator of the same conditional probability -- the ratio of prison admissions to convictions in adult felony courts -- is shown in the final column of Table 17. This column of ratios is based on non-transactional data, and potentially, the ratios can be affected by many comparability problems: e.g., time lags between being sentenced to and admitted to prison, suspension of some sentences to imprisonment, representation among prison admittees of some offenders who have not been convicted of a new crime. Despite such problems, the two columns of figures do not differ drastically from each other. In this instance at least, estimations of the chances of imprisonment would not be improved greatly by having (a) transactional data covering convictions, sentences, and prison admissions, and (b) data about routes to prison other than conviction in court on a new crime (e.g., revocations of conditional release on the basis of technical violations).

Even with all of the drawbacks of using non-transactional data, we can have some confidence in concluding that the chance of imprisonment for adult felony arrestees did increase in Illinois between 1973 and 1980. The size of the chance during any given year or the amount of change during the years cannot be estimated with any precision, primarily because of the difficulty in estimating the conditional probability of prosecution in adult court given arrest on a felony charge. But it is fairly clear that the increase in the chance of imprisonment during this period can be attributed to the prosecutorial component of the criminal justice system via increased rates of charging and increased conviction rates. In

contrast, aggregate sentencing practices -- at least in terms of the proportions of adult court convictions resulting in prison or death sentences -- have changed little during the eight-year period.

Of course, changes in reporting and recording practices may have occurred, making the increase a "paper increase." But, for the purpose of illustrating some of the problems involved in pulling together information collected independently by separate criminal justice system components, the accuracy of each component's information has been assumed.

Illustration with Transactional Data

California instituted a centralized, statewide OBTS system in 1975. Prior to 1975, data were collected independently from law enforcement agencies, prosecutors, and the courts. In the pre-1975 data, there are large disparities between the numbers of felony arrests that resulted in the filing of complaints and the numbers of cases disposed of by the courts. Between 1968 and 1973 (1974 data were not available), the ratio of lower and superior court dispositions to complaints filed reached a peak of 0.66 in 1971: about 113,500 dispositions to 172,00 complaints filed. It is unclear whether the pre-1975 statistics linking court processes with police prosecutorial decisions are truly transactional, but even if they are, the large discrepancies between filings and dispositions makes them problematic.

Another shortcoming of the pre-1975 statistics in California is that they do not include sentencing information for convictions

in lower courts. This makes it impossible to estimate the chance of incarceration (prison or jail sentence) for adult felony arrestees. However, virtually all sentences to state institutions -- defined in this monograph as imprisonment in California -- are meted out in superior courts,* so the chance of imprisonment for the pre-1974 years can be estimated.

California publications rightly warn against making comparisons between the pre-1975 statistics and the ones generated by their OBTS system. In fact, judging from the ways in which California has presented its published data, it is probably more accurate to look at the series in three phases: a pre-1974 phase, a transitional phase extending from 1974 through 1978, and the full OBTS phase starting in 1979. An exception within the felony processing statistics may be the dispositional and sentencing data from superior courts, which appear to be relatively comparable throughout the period for which they are available.

Table 18 presents estimates of the branching process probabilities associated with the chance of incarceration/imprisonment in California from 1968 through 1981. Conditional probabilities pertaining only to the superior courts appear below the dashed line in the table. Because lower court sentencing data were not

*There may be a minor exception. In more recent years -- when lower court sentencing information is available -- some offenders have been sentenced to the Youth Authority by California's lower courts, a disposition classified here as imprisonment. However, the numbers are relatively miniscule, and unless the practice was much more prevalent in earlier years, these sentences can be ignored safely.

published prior to 1975 (or for 1978), the conditional probabilities of incarceration given conviction (row C in the table) could not be computed for those years. In addition, no published counts of lower court dispositions and convictions for 1974 were located, so additional probabilities are missing for those years.

The discontinuities in the statistical series are noticeable in the first row of data in Table 18. The numbers of felony arrests disposed of rise continuously from 1968 through 1974, drop precipitously from 1974 to 1975, decline slowly from 1975 to 1977, and show another steady increase from 1977 through 1981. This row of figures reflects changes in data systems and in the numbers of arrests actually disposed of. For example, the decline from 1975 through 1977 corresponds to a decline in the total numbers of felony arrests during those years, which can be traced to a statutory change relating to marijuana offenses (see Cal. Dept. of Justice, 1980a: 6 and 8). However, the major drop in arrests disposed of coincides with the change-over from the pre-1975 data system to the OBTS system. This drop obviously reflects the beginning of the practice of reporting only those disposed-of arrests for which full system-flow information is available. In published data from 1975 on, the numbers of cases given various dispositions in any component of the criminal justice system add up to the number of cases entering that component from the prior component. In the pre-1975 data, as noted earlier, there were large disparities between the numbers of complaints filed and the sums of the cases disposed of by the lower and superior courts.

TABLE 18

Branching Process Probabilities for Adult Felony Arrests Disposed of in California, 1968-1981

Year[a]	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Arrests disposed of	160,439	188,316	204,935	219,231	231,863	233,023	256,252	174,069	157,537	145,525	150,004	170,980	189,303	205,168
Probability of:														
A. Filing of complaint, given arrest	.721	.740	.774	.784	.801	.797	.826	.780	.796	.773	.763	.756	.747	.744
B. Conviction, given filing of complaint	.754	.735	.739	.758	.754	.739	NA	.621	.698	.730	.742	.755	.747	.764
C. Prison or jail sentence,[b] given conviction	NA	NA	NA	NA	NA	NA	NA	.598 (.202)[c]	.622 (.224)	.651 (.236)	NA	.688 (.231)	.701 (.229)	.724 (.238)
D. Prison sentence, given conviction	.183	.142	.126	.116	.118	.153	NA	.087	.096	.103	.108	.115	.120	.143
E. Disposition in Superior Court, given filing of complaint	.707	.670	.610	.574	.528	.583	NA	.259	.288	.294	.302	.304	.309	.340
F. Conviction, given disposition in Superior Court	.856	.850	.843	.859	.866	.856	.859	.818	.847	.863	.865	.887	.893	.886
G. Prison or jail sentence, given conviction in Superior Court	.643 (.358)[c]	.593 (.322)	.595 (.303)	.598 (.282)	.631 (.278)	.663 (.283)	.725 (.258)	.782 (.286)	.822 (.325)	.846 (.344)	.862 (.344)	.873 (.353)	.884 (.352)	.894 (.388)
H. Prison sentence, given conviction in Superior Court	.228	.183	.181	.179	.195	.227	.202	.232	.272	.294	.307	.320	.324	.362

[a] Offender-Based Transaction Statistics (OBTS) system instituted in 1975.

[b] Prison sentences include sentences to prison, death, the Youth Authority, the California Rehabilitation Center, and state hospitals for mentally disordered sex offenders. Total jail sentences include sentences that combine jail and probation.

[c] Probabilities in parentheses computed with combination jail-probation sentences excluded from numerator

NA = data not available

SOURCES: Cal. Dept. of Justice, 1973, p. 42; 1978, p. 5; 1980, p. 41; 1981, p.45; 1982, p.47; 1980a, pp. 12-13.

Row A of Table 18 shows the conditional probabilities that a complaint was filed given that a felony arrest occurred. Even ignoring 1974, for which the Row A figure and figures in other rows of Table 18 appear anomalous, the probabilities in Row A are difficult to interpret. When taken at face value, they suggest that the rate of formal charging increased from the late 1960s until the mid 1970s and declined thereafter. However, we also know that the reversal in the "trend" corresponds to the changeover in data systems. In any event, the total amount of variability in these probabilities is not enormous: from 0.72 to 0.80 (again, ignoring 1974).

Row B reveals a different pattern for the conditional probabilities of conviction in lower or superior courts given the filing of a complaint. In the pre-OBTS period, the probabilities fluctuate slightly, but a significant decline shows up in 1975, and the probabilities generally rise from 1975 to 1981. Again, one is tempted to attribute the 1975 decline and post-1975 recovery to the changeover in data systems, especially because, from 1977 to 1981, the probabilities fluctuated around a level that is comparable to the pre-1975 level.

Rows C and D show, respectively, the conditional probabilities of incarceration and imprisonment given conviction in lower or superior court. Row C has two probabilities for each year after 1974, with the exception of 1978. The first of the numbers reflects the conditional probability of receiving any sentence with a confinement component given conviction. For the numbers in parentheses,

the probabilities are recomputed without the combination jail-probation sentences which -- as noted earlier in this chapter -- are so prevalent in California. All three of the conditional probabilities in Rows C and D show continuous increases from 1975 to 1981. Conditional probabilities of incarceration (Row C) cannot be computed for 1974 and earlier, but the conditional probabilities of imprisonment (Row D) before 1974 show a decline from 1968 to 1971-72, followed by a jump upward in 1973. As with the conditional probabilities of conviction in Row B, it is tempting to attribute the pattern of probabilities in Row D to the changeover in California's data systems. But, as we shall see next, a separate examination of the dispositional and sentencing data from the superior courts indicates that the increases in conditional probabilities of incarceration and imprisonment are real increases. The sudden drop in the probability of imprisonment (Row D) in 1975. however, is almost certainly a result of the changeover to a statewide OBTS system. The improvement in case reporting brought about with the OBTS system probably affected reporting of lower court cases more than the reporting of superior court cases. This differential improvement in reporting would increase the denominators of the post-1974 probabilities in Row D while leaving the numerators virtually unaffected.*

*The one exception, pointed out earlier, is the small number of people sentenced to the Youth Authority by the lower courts. These cases are in the numerators of the post-1974 probabilities in Row D of Table 18, but they could not be included in the numerators of the earlier probabilities.

The probabilities appearing below the dashed line in Table 18 focus on California's superior courts. As noted earlier, information about dispositions and sentences in superior courts has been less affected by the changeover to an OBTS system than has information pertaining to the lower courts. In fact, this is visible in the first row of probabilities below the dashed line in Table 18. In Row E, the probabilities for 1968 through 1973 reflect the ratios of superior court dispositions to the sum of reported superior and lower court dispositions. As pointed out at the beginning of this section, the sum of superior and lower court dispositions does not come anywhere near the total number of complaints filed in any of the pre-OBTS years. Under the assumptions that under-reporting of dispositions is greatest for the lower courts and that the OBTS system brought some improvement to this problem, it is easy to understand why the pre-OBTS figures in Row E are so much larger than the post-OBTS figures. It is an open question whether the increase in the probabilities from 1975 to 1981 represents a growing tendency to file complaints in superior rather than lower courts or the working out of "kinks" in the OBTS data system.

The rates of conviction among superior court dispositions (Row F) show a pattern similar to the rates of conviction among combined superior and lower court dispositions (Row B): slight fluctuations from 1968 through 1974, followed by a sharp drop in 1975 and a gradual recovery thereafter. While the changeover to the OBTS data system almost certainly had an influence on this

pattern, the rather high conviction rate levels attained in the last few years of Row F (1979-1981) suggest that some of the post-1975 increase may be real.

Rows G and H, respectively, in Table 18 present the conditional probabilities of receiving a sentence to incarceration and imprisonment given conviction in superior court. If we again ignore the anomalies in the 1974 data, the probabilities of receiving a sentence of confinement after being convicted in superior court have increased continuously from 1970 or 1971 until the most recent year for which data are available. This is consistent with trends in Rows C and D from 1975 on, and it is the reason one should be hesitent about attributing the patterns in Rows C and D completely to the changeover in data systems.

The three sets of probabilities in Rows G and H of Table 18 allow us to compare trends in the components of the chance of incarceration. In any given year, each of the three probabilities uses the same denominator (convictions in superior court), but the numerators differ in inclusiveness. The numerators of the probabilities in Row H contain sentences to state institutions (see footnote b in Table 18); straight jail sentences are added to form the numerators of the probabilities that appear in parentheses in Row G; combination jail-probation sentences are added to compute the upper probabilities in Row G. Examining these three sets of probabilities vis-a-vis each other, we find that the most severe and the least severe components of the chance of incarceration -- the probabilities of receiving a prison sentence and a combination

jail-probation sentence, respectively -- have risen during the 1970s and into the 1980s, while the probability of receiving a straight jail sentence after conviction in superior court has declined.

Even after taking all of the caveats about the California data in Table 18 into account, it seems reasonable to conclude that the chance of incarceration, given arrest for a felony, has increased in that state, probably since the early 1970s, but almost definitely since 1975. However, the components of this increase differ from those determined -- in the preceding section -- as being responsible for the rise of the chance of imprisonment in Illinois. In both states, the conditional probability of conviction given the filing of complaint in court appears to have increased from the mid-1970s onward. But, in contrast to Illinois, the rate at which arrests result in the filing of complaints has decreased and the rate at which sentences involving incarceration are meted out to convicted offenders has increased in California.

However, the purpose of this report is not to answer substantive questions about the use of confinement; rather, it is to provide discussion and illustrations pertaining to the possibilities and problems involved in measuring the use of confinement. The longitudinal illustrations of the chance of imprisonment and incarceration derived from published Illinois and California data serve this purpose well. They suggest interesting substantive conclusions that must be treated very gingerly because of the

measurement problems that exist in the data sets from which the conclusions were derived.

The Meaning and Utility of Chance Measures

Throughout most of this chapter, we have been discussing -- with the help of specific, quantitative illustrations -- the problems involved in constructing and analyzing cross-sectional and longitudinal measures of the chances of incarceration and imprisonment. Limited data availability has forced us to concentrate on the chance of imprisonment for adults; the broader issue of the chance of institutionalization could not be addressed at all.

It is important to shake free from the often tedious task of examining problems in particular data sets and re-emphasize what the concept of chance measurement represents. As pointed out, fraction measures are static; they pertain to the proportions of specified base populations being held in confinement at a given point in time. In contrast, chance measures pertain to processes: the probabilities that people in a specified base population will be admitted to confinement over a given span of time.

In criminal justice, chance measures are particularly interesting because they represent the cumulation of decisions made about cases at the various stages of the criminal justice system. That is why we conceptualized the chances of imprisonment and incarceration as branching probability processes that take into account the conditional probabilities of moving through each stage

of the system in a way that results in confinement. This conceptualization makes cross-sectional and longitudinal analyses of chance of imprisonment and incarceration highly relevant to the substantive understanding of the criminal justice system. At the same time, analyses using this conceptualization demand a great deal of data that, for the most part, are not readily available in published reports.

As existing OBTS systems accumulate data over more years and as OBTS systems become firmly established in more states, it will be easier to conduct longitudinal analyses of branching probability processes and to compare the branching probability processes across jurisdictions. For now, the most fruitful application of OBTS data to chance of incarceration/imprisonment issues probably involves cross-sectional comparisons of chances among subgroups within the same jurisdiction, such as those made among four types of crime in Table 16. At least this usage eliminates the confounding problems of differential definitions, categorizations, and methods of computation that abound when comparisons are made across jurisdictions or when longitudinal analyses are conducted with data systems that have undergone substantial revisions over time.

The differentiation between fraction and chance measures is a basic issue in measuring the use of confinement. But there are other issues as well. In the next chapter, time served -- which provides the link between chance and fraction measures -- and the measurement of prevalence in the use of confinement will be discussed.

CHAPTER V

OTHER MEASUREMENT ISSUES

To this point, the discussions and illustrations have focused on two types of measurement -- fractions and chances -- as they relate to institutionalization, incarceration, and imprisonment. A fraction, as defined in this report, refers to the proportion of a base population held in confinement at a given point in time, while a chance refers to the probability of being admitted to confinement during a given time period for people in a specified base population.

Fractions and chances are the measures most often at issue when the use of confinement is studied or debated. But there are other measures that focus attention on different aspects of the use of confinement. In this chapter two such measures are discussed: (a) time served, which provides the link between the numerators of chance and fraction measures, and (b) prevalence, which refers to exposure to confinement among cohorts of the general population. Again, data availability forces us to illustrate the measures almost exclusively in relationship to imprisonment rather than to incarceration or institutionalization.

Time Served

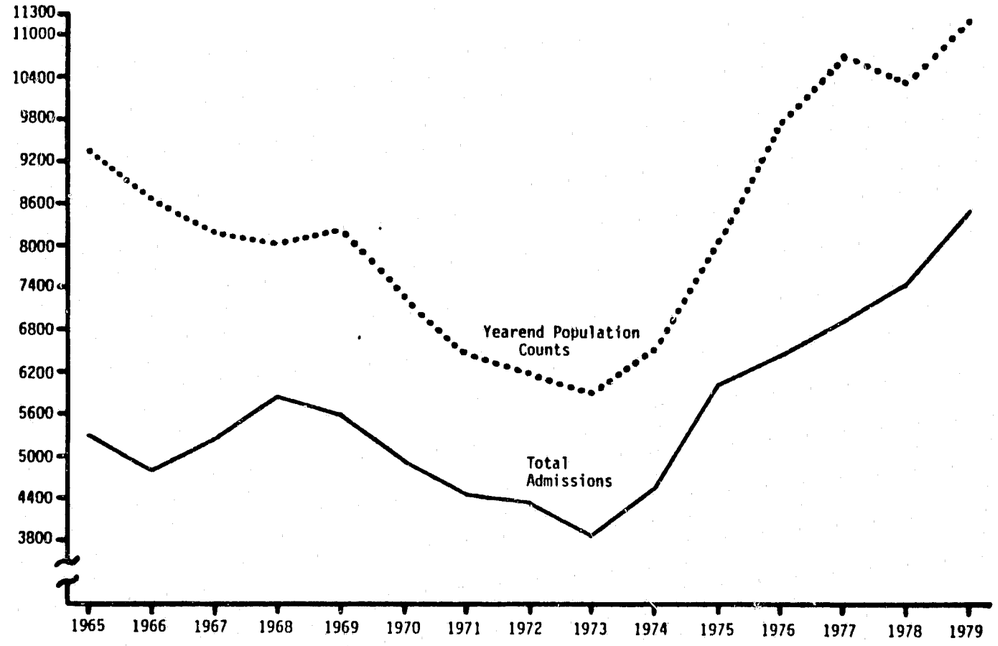
The Link Between Chances and Fractions

Saying that time served provides the link between the numerators of chance and fraction measures, simply means that the effect of admissions to confinement over a period of time on the number of people held in confinement at a given point in time depends on how long the admittees remain in confinement. Usually, when the numbers of admittees increases or decreases steadily over a period of years, the numbers of persons held in confinement at yearend show concommitant increases or decreases over the same years. But a pattern of positive covariation is not a logical necessity. During a period of increasing admissions, for example, drastic reductions in the average length of time that people stay confined could produce decreases in the yearend counts of people held. At the opposite extreme, a period of decreasing admissions could be characterized by increases in the yearend counts of people confined if the average time served was increasing substantially.

It is unlikely that either of the extreme possibilities just mentioned will be found very often, at least for any long period of time. It is more likely that admissions and counts of persons held, when changing, will change in the same direction, but because of the effects of time served, they will show different amounts of change. This is illustrated in Figure 8, using Illinois prison data on admissions and December population counts from 1965 through 1979. In Figure 8, there is only one multi-year period -- 1966

FIGURE 8

Yearend Population Counts and Annual Total Admissions,
Illinois State Prison System, 1965-1979



SOURCE: Ill. Dept. of Corrections, 1982a:168, and 1980b:21.

to 1969 -- in which admissions and population counts changed in opposite directions.* Both sets of numbers declined between 1969 and 1973, and both rose between 1973 and 1977.** However, in the two multi-year periods during which admissions and population counts changed in the same direction, the amounts of change differed. In the 1969-1973 period, admissions declined by 1,771 persons (from 5,610 to 3,839), while population counts declined by 2,362 (from 8,262 to 5,900). Between 1973 and 1977, the increase of 3,083 (from 3,893 to 6,922) in admissions was less than the increase of 4,786 (from 5,900 to 10,686) in population counts.

The differing amounts of change reflected in admissions and population counts during the two multi-year periods in which they changed in the same direction -- 1969-1973 and 1973-1977 -- can be attributed to the effects of time served, but without the necessity of inferring that average time served changed during those periods. For example, the larger decrease in population counts than in admissions during the 1969-1973 period can be traced, at least partially, to the spurt in admissions that occurred in 1967 and 1968. As these admittees were absorbed into the prisons, the rather steady decline in yearend population counts from 1965 to 1967 slowed between 1967 and 1968, and even reversed slightly between 1968 and 1969. But from that point until 1973, population counts declined rapidly, not

*The figures also moved in opposite directions in the one-year period, 1977 to 1978.

**In addition, both declined in the one-year period, 1965 to 1966, and both increased in the one-year period, 1978 to 1979.

only because admissions were declining, but also because relatively large numbers of 1967 admittees were reaching their release dates in 1968.

In the 1973-1977 period, yearend population counts grew by a greater amount than did admissions. But during the first part of this period (1973 to 1975) both measures increased at the same pace: Admissions were 2,193 higher in 1975 than in 1973, while yearend population counts were 2,145 higher in 1975 than in 1973. Then the effects of time served began to show up on yearend population counts, which increased more rapidly than admissions between 1975 and 1977. The recent admittees, particularly those admitted in 1975, "backed up" in the prisons, while the pool of people ready for release consisted primarily of the smaller numbers of prisoners who were admitted in 1972, 1973, and 1974. It was not until the last few years illustrated in Figure 8 (1977-1979) that yearend population counts began to ease, as the large admittee cohorts of the mid-1970s became eligible for release.

The discussion above is not meant to imply that there were no changes in the average time served by prisoners in Illinois between 1965 and 1979. It simply shows that the patterns in Figure 8 are consistent with an explanation that does not require changes in time served -- an explanation that focuses on the "lag effect" that time served introduces between numbers of admissions and yearend population counts, even when time served remains constant.

The Cohort Problem

Although the measurement of time served, as the link between admissions and persons present at a given point in time, is important to understanding and projecting prison population changes, it is also important as an independent aspect of the use of confinement. Differences in time served among jurisdictions and changes in time served over a number of years within a single jurisdiction are indicators of variability in the stringency with which confinement is used, just as differences and changes in fraction and chance measures are. Unfortunately, a fully satisfactory way of measuring time served is elusive.

Leaving aside the ever-present problem of data availability, the basic problem one confronts in measuring time served adequately is that time served is determined by two decision processes -- commitment and release -- that usually occur at different points in time and involve different actors responding to different considerations. Persons are admitted to confinement on the basis of decisions that set some parameters concerning how long they will remain confined. In the case of a jail sentence, the sentencing decision may often reflect the actual time served to the day. But sentences or commitments to other institutions -- prisons, juvenile facilities, mental institutions, and so forth -- usually contain a large measure of indeterminacy on the issue of how much time actually will be spent in confinement. The degree of indeterminacy varies among jurisdictions and over time. Thus, the parameters of sentencing or commitment decisions, by themselves, are generally

not adequate indicators of time served.* Experience-based indicators, derived from the actual time spent in confinement, appear to represent the best alternatives.

Recoginition of the need for experience-based indicators of time served does not settle all the measurement questions. One of the primary problems with choosing an experienced-based indicator of time served is that the indicator can be derived from either of two cohorts: people admitted to confinement during a given time period or people released from confinement during a given time period. Each of these cohorts has its own drawbacks. People in an admission cohort will have been subject to similar sentencing or commitment practices, but the release dates of the cohort members can be spread over a large number of subsequent years, making them subject to changing release practices. Conversely, the members of a release cohort obtain their freedom under similar release criteria, but their admissions to confinement -- spread out over a number of past years -- may have resulted from a variety of different sentencing or commitment practices.

Because time served is determined by separate admission and release decisions, which can be years apart, it is cumbersome to make statements about the level of time served in a given year. For example, a question about time served in prison could be asked

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*Of course, whenever the nature of sentencing or commitment decisions permits the expected length of confinement to be estimated with a great deal of precision, such estimates would be useful indicators of the use of confinement, especially when used in conjunction with chance measures.

as: "How did median time served in 1978 compare to median time served in 1977?" When time served is defined in the way it has been in this section -- the length of time between admission and release -- there is really no satisfactory answer to the question. The median time served by prisoners released in the two years may reveal something about changes in release practices, but the message is confounded by possible variability in sentencing practices during the past years in which members of the release cohort entered the prison system. Similarly, information about the median time served by prisoners admitted in 1977 and 1978 bears on the issue of changes in sentencing practices between those two years, but any conclusions would be clouded by the possibility of changing release practices during the subsequent years in which members of the admission cohorts are released. Perhaps the only way that it is meaningful to talk about time served for a given year is in reference to the total number of person days spent in confinement during the year. This measure does have some utility, and it will be discussed in Chapter VI.

There is no "solution" to the cohort problem in the sense of a decision that states that the measurement of time served should be based on an admission cohort rather than on a release cohort, or vice-versa. The appropriateness of an admission or release cohort depends on the purpose of the research. Obviously, if time served is to be used as an indicator of the effects of a change in sentencing policy, cohorts of admittees from before and after the point of change are preferable, but if the focus is on the effects

of a change in parole policy, then release cohorts are more relevant. However, in either case, the researcher should be aware of the cohort problem, and should explore the likelihood that decisions other than those of immediate interest to the researcher are affecting the data on time served.

The cohort problem is, perhaps, the most basic issue involved in the measurement of time served. But there are other issues, which can be addressed through the presentation of a few illustrations.

Illustrations

Researchers who must rely on published reports for their information about time served will soon find that the question of whether to examine admission or release cohorts is moot; virtually every published state and federal report of time served information is derived from release cohorts. The first illustration in the following paragraphs consists of a brief discussion of some California data that comprise one of the rare examples of time served information about admission cohorts. Then attention turns to more widely available data about release cohorts to illustrate some additional problems involved in measuring time served.

The annual report concerning felony prisoners in California (California Prisoners) contains a mode of data presentation that is unique among the states: the proportions of yearly prison admission cohorts still present on December 31 of subsequent years. The data for prisoners admitted each year from 1965 through 1979 are presented in Table 19. Note that the table includes only males

CONTINUED

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newly received from court (e.g., excluding parole returnees) with felony convictions in each year. The problems involved in assessing time served for other categories of prisoners is discussed later.

The figures in Table 19 suggest a process by which more rapid turnover of inmates compensates for a spurt in prison admissions. The number of admissions declined gradually from 1965 until 1972, but from that point until the end of the period, admissions increased rapidly.* However, the increasing admissions coincided with decreases in the percentages of prisoners remaining at the ends of the various years after admission. For example, about 85 percent of the male prisoners newly admitted in 1973 were still in prison at the end of the next year, and this figure declined substantially to about 51 percent for 1979 admittees. Patterns for the third and later years after admission are not as clear because data are less and less available for more recent cohorts. Nevertheless, decreases in the percentages of inmates remaining among the admission cohorts from 1973 on appear to have occurred in the third and fourth years after admission, but not in the fifth and later years. Perhaps there is a small core group of serious offenders with long sentences who are less affected by changes in release practices that are meant to relieve system overcrowding.

*Although not shown in Table 19, the increase in admissions continued through 1980; in that year, 10,657 male felons were newly received from court (Calif. Dept. of Corrections, California Prisoners, 1980, p. 16).

TABLE 19

Male Felons First Admitted to California Department of Corrections Facilities from 1965 through 1979, and Proportions of Each Cohort Remaining in Facilities in Subsequent Years

Year of Admission	Number Admitted[a]	Percent still in prison on Dec. 31 after admission: Same year[b]	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year
1965	5,626	-	76.4	50.4	31.2	18.1	10.8	5.4	3.2
1966	5,164	-	77.4	54.9	31.8	17.5	7.8	4.8	3.9
1967	4,872	-	84.9	56.1	31.3	13.8	7.0	5.2	3.6
1968	4,667	-	83.8	53.2	23.2	11.2	8.0	6.3	3.1
1969	4,496	-	80.0	43.7	20.2	13.8	10.1	4.0	2.8
1970	4,426	-	71.2	40.1	24.9	17.5	6.4	4.0	2.7
1971	4,472	-	70.4	48.0	31.0	10.6	5.6	3.3	2.6
1972	4,272	-	80.5	61.2	21.9	9.7	4.6	3.2	2.7
1973	4,839	-	85.2	44.2	17.4	7.5	4.7	3.5	3.0
1974	5,081	-	73.0	36.4	12.0	6.5	4.4	3.7	
1975	5,433	-	67.2	29.9	12.5	6.5	4.6		
1976	6,463	-	59.8	27.5	12.1	6.5			
1977	7,065	-	53.9	25.8	11.7				
1978	8,753	-	54.1	25.4					
1979	9,203	-	51.4						

[a] Includes only male felons newly received from court during year. Excludes female admittees, non-felons, returned parolees (with or without a new conviction), and miscellaneous categories of admittees.

[b] Data not available from reception centers, so proportions confined at end of year of admission could not be computed.

SOURCE: Calif. Dept. of Corrections, California Prisoners (annual).

The suggested explanation for the patterns displayed in Table 19 may be incorrect; additional research would be required before firm conclusions could be drawn. But the purpose is to illustrate measurement issues, not to draw substantive conclusions, so let us assume that the interpretation is correct. Would the same conclusion have been reached by using time served data drawn from release, rather than admission, cohorts? Table 20 presents data on median months served by male felons who were released from California prisons on first parole from 1965 through 1980. Admittedly, the time served data in Tables 19 and 20 are in different forms; median time actually served by admission cohorts was not presented in any of the state reports examined during this research. Nevertheless, the tables are sufficiently comparable to illustrate the point being made here.

As should be expected, there is a decline in time served among the release cohorts in Table 20, but the decline begins at a later date than the decline among admission cohorts in Table 19. While the decrease in time served among admittees began at almost the same time as the increase in prison admissions (1972-1973), the decrease in median time served among release cohorts did not begin until 1976. From the discussion so far, the reason for this disparity should be obvious: The release cohorts in 1972 to 1975 (when time served among admissions cohorts was already declining) still consisted of prisoners admitted in earlier years, who tended to stay in prison for longer terms. Thus, the "lag effect" of time

TABLE 20

Median Months Served by Male Felons Released on First Parole From California Department of Corrections Facilities, 1965-1980

Year of Parole	Number Paroled[a]	Median Time Served (in months)
1965	8,163	30
1966	6,489	30
1967	6,709	30
1968	6,021	36
1969	7,217	36
1970	8,016	36
1971	9,489	36
1972	7,288	32
1973	4,899	30
1974	4,717	35
1975	10,578	39
1976	6,958	34
1977	9,310	30
1978	8,783	26
1979	9,422	25
1980	11,080	24

[a] Includes only male felons paroled for first time during year. Excludes female parolees, non-felons, persons reparoled after return to prison (with or without a new conviction), and persons released by means other than parole.

SOURCE: Calif. Dept. of Corrections, California Prisoners, 1980, p. 115.

served makes it necessary to interpret time served information from admission and release cohorts differently.

Tables 19 and 20 provide illustrations of time served data on two types of cohorts (admission and release) and two different methods of presenting time served data. Table 20 is by far the most common example of time served information in published state reports -- average (median or mean) time served by persons released in a given year. At the national level, median time served by first releasees who had sentences of one year or more was published as part of the National Prisoner Statistics program. The data were generally broken down by state, type of release, and offense; other tabulations were provided by categories of length of time served (see, for example, Federal Bureau of Prisons, 1967). Because of nonparticipation by some states, missing information from participating states, and difficulties with definitions, time served information has not been presented in the National Prisoner Statistics since 1970. However, the Uniform Parole Reports program still presents information on median time served for prisoners entering parole in the jurisdictions participating in the program (see, for example, BJS, 1981f).

Table 19 and 20 also provide a starting point for discussing some other problems in measuring time served. Recall that Tables 19 and 20 dealt with specific categories of admittees and releasees -- felons first admitted and felons first paroled.*

*Both tables were also sex-specific, but that is not an important consideration in this discussion.

There are, of course, other types of admissions and releases, and it is likely that time served will vary across types of admission or release. In examining this issue further, we will focus on releases because, as noted earlier, very few reports provide information about time served for admission cohorts.

The 1979 National Prisoner Statistics reported 146,622 releases from state institutions (BJS, 1981:21). The overwhelming majority (88 percent) were conditional releases, which includes discretionary or mandatory release to supervision (73 percent) or unconditional releases, which consists primarily of prisoners who have served their full sentences (15 percent). The next largest category is "Escapees and AWOL's," which accounts for only 6 percent of the releases.

Computation of time served for categories of prison departure other than conditional and unconditional releases presents a variety of problems. For example, some of the categories used by the National Prisoner Statistics represent releases that are often temporary: escape, AWOL, out on appeal or bond. Another category -- transfers to other jurisdictions -- often involves the continuation of confinement in some other place. Finally, the death of a prisoner held in confinement -- by a cause other than a state-conducted execution -- means that the prisoner's "departure" from confinement occurred before the state decided that release was appropriate.

Inclusion of all categories of intake and departure is necessary if the purpose is to study use of an institution's physical capacity. But if time served is defined as the length of time that

the state deems it necessary to hold people in confinement, then inclusion of the smaller departure categories in a analysis of time served among release cohorts can be misleading. Fortunately, the categories other than conditional and unconditional releases are small enough so that they can be excluded from the analysis.

Although we can safely focus our attention on the two major categories of release in an analysis of time served, closer examination reveals several measurement problems within those categories, problems raised by the question: From what point in time does one start in computing time served for a prison releasee?

A major problem is that not all persons receiving a conditional or unconditional release are "first releasees"; many are being released after a return to prison stemming from a parole violation or a new conviction while under supervision in the community. For persons being rereleased, it is relevant to consider whether time served should consist of only the amount of time spent in confinement since the last return to prison or whether it should include the prior term (or terms) associated with the initial conviction. On one hand, it is arguable that only the most recent period of confinement should be counted for rereleasees because the continuity of confinement has been broken by a period (or periods) of supervision in the community. On the other hand, if the person has been under continuous correctional supervision -- prison, parole -- since the initial conviction, it seems reasonable to sum all of the periods spent in confinement to compute time served at release.

The decision about how to compute time served for prisoners being rereleased can make a fairly large difference in results. The difference is illustrated in Table 21 with data pertaining to prisoners first released and rereleased from Wisconsin adult correctional facilities during 1980. Median months served for the two categories of releasees are computed two ways: since most recent admission and since last new admission. Of course, the two computations produce the same result for first releasees because their most recent admission is also their last new admission. But among prisoners being rereleased. the two time served figures differ substantially. Since most (86 percent) of the 292 rereleasees had only one prior release since their last new admission (Wis. Dept. of Health and Social Services, 1981b:18), their median length of stay since last admission generally reflects their time served after initial conviction plus one additional period of time served after being removed from parole. Thus, it is not surprising that median length of stay since last new admission for rereleasees (33.6 months) in Table 21 is very close to the sum of the median lengths of stay since most recent admission for first releasees (20.9 months) and rereleasees (11.9 months).

Table 21 makes it clear that the total time served by a cohort of releasees will be underestimated if the calculation ignores the prior time spent in prison under a continuous period of correctional supervision by persons in the cohort who are being rereleased. However, there is a great flaw involved in counting these prior episodes of imprisonment for rereleasees, especially when longitudinal

TABLE 21

Median Length of Stay in Wisconsin Adult Correctional Institutions Since Most Recent Admission and Last New Admission, Prisoners First Released and Rereleased in 1980

	Median Length of Stay (in months)	
	Since Most Recent Admission	Since Last New Admission
First Releasees (n=1,305)	20.9	20.9
Rereleasees (n=292)	11.9	33.6

SOURCE: Wis. Dept. of Health and Social Services, 1981b, pp. 15-16.

analyses of time served among release cohorts are being conducted. The flaw stems from the fact that, within any given cohort of releasees, some of the people being conditionally released for the first time will be returned to prison and rereleased at a later date. Because these people cannot be identified at the time of first release, the time they have served must be included in the computation of time served for the release cohort. Later, upon rerelease with a subsequent release cohort, inclusion of their initial periods of imprisonment in a calculation of time served for the new cohort would be misleading because the initial periods would have already been counted in the time served by the earlier release cohort. Some prisoners might even receive first parole, be returned to prison, and be rereleased all within the same year,* in which case they would appear twice in the release cohort, and their initial period of imprisonment would be counted twice in the cohort's time served total, if time served for rereleasees were to be computed from the date of last new admission.

It seems clear that, when average time served is used as a longitudinal measure of the use of imprisonment, time served by persons being rereleased should be computed from the date of their most recent admission. Because average time served (since most recent admission) by rereleasees is generally much shorter than average time served by first releasees, the data from the two

*This is not as unlikely as it may seem at first because failure rates are highest during the first 12 months on parole (BJS, 1981f:26) and time spent in prison after parole revocation is relatively short.

groups should be analyzed separately unless the proportional representation of the two groups in the release cohorts has remained relatively constant over the years of interest. Of course, the same caution applies when cross-sectional comparisons of time served among release cohorts from different jurisdictions are made; the mix of first releasees and releasees is likely to vary among release cohorts from different jurisdictions.

A decision about how to handle rereleasees in computing time served does not answer all the questions concerning the appropriate point in time from which to compute time served for prison releasees. Even among prisoners receiving their first release in a given year, there will be many who have experienced continuous periods of confinement, associated with the same offense, that extend well back before their entry into the prison system: months or even years in jail awaiting trial and transfer, in a juvenile facility before reaching a particular age, in a special mental health treatment facility. Information about the continuous experience of confinement stemming from a particular charge or set of charges would allow measurement of time served in incarceration rather than time served in prison. Unfortunately, during this research, published reports in which this type of information is presented have not been located. Assumedly, the information could be derived from a fully developed Offender-Based Transaction Statistics (OBTS) system in conjunction with an Offender-Based State Correctional Information Statistics (OBSCIS) system in the same jurisdiction.

Several points that were raised in the discussion of the numerators of fraction measures (Chapter III) are relevant to the measurement of time served. First, the definitional boundaries that determine, on the basis of sentence length, the allocation of offenders to state and local facilities must be taken into account when time served in prison is compared across jurisdictions. Because length of sentence is strongly related to time served, it would be inappropriate to compare the average time served in prison by an admission or release cohort in a state that allows prisoners to serve sentences as long as two years in local facilties (e.g., Pennsylvania) with average time served in a state such as North Carolina, which allows relatively short sentences to be served in state prisons.

Second, time served is also strongly related to conviction offense, and as we saw in Chapter III, the offense mix in prison populations can vary over time and across jurisdictions. This is not meant to imply, for example, that an increase in the proportion of serious offenders in a series of admission or release cohorts will transalte necessarily to an increase in time served for the cohorts. In fact, California data in Table 9 (Chapter III) show that the proportion of offenders convicted of violent crimes in the prison population has been rising since 1965, while Tables 19 and 20 indicate that time served has been decreasing, at least since the early or mid 1970s. Seriousness of conviction offense can still be related strongly to time served while the entire scale of time served (across offense types) shifts downward in response

to other factors, such as the pressure of rapidly increasing prison admissions in California. However, in the scientific realm of "all other things being equal," one would expect major changes (or differences across jurisdictions) in the distributions of offense types among admission or release cohorts to be associated with concommitant changes (or differences) in average time served by the cohorts. At the very least, offense mix is a factor to consider in longitudinal and cross-sectional analyses of time served.

The final factor relating to time served measurement that will be discussed here is conditions of confinement. It was pointed out in Chapter III that a pair of jurisdictions might hold similar fractions of their populations in confinement, but that it would be misleading to say that use of confinement is the same in the two jurisdictions if the conditions of confinement -- crowding, violence, medical care, sanitation, food, and so forth -- were substantially worse in one of the jurisdictions than in the other. The same line of thought applies to time served: 12 months in a crowded, violent, "hell hole" is not equivalent to 12 months in a new, well-managed facility in which the inmates have numerous opportunities for meaningful work and self-advancement. But again, conceptualization and measurement has barely begun on the issue of conditions of confinement, and it is a factor that will have to await future, more thorough analyses of the use of confinement.

Time served has been discussed both as the link between the numerators of chance and fraction measures and as an important

indicator of the use of confinement in its own right. Attention now shifts to a way of measuring the use of confinement that is quite different in meaning than the fraction, chance, and time served measures discussed so far.

Prevalence Measures

The prevalence of confinement is defined as the proportion of people in a specified cohort of the population -- usually an age cohort -- who experience some form of confinement at least once during a given period of time. We can examine the prevalence of institutionalization, incarceration, or imprisonment by specifying the types of confinement facilities of interest. Again, because of the lack of readily available data on institutions other than state prisons, the illustrations of prevalence measurement in this section will deal only with the prevalence of imprisonment.

Logically, prevalence measures can vary with a great deal of independence from variation in fraction, chance, or time served measures. One would expect that chance measures -- at least those using the total resident population or some subgroup of the resident population in their denominators -- would be more closely associated with prevalence measures than would fraction or time served measures: the greater the chance of admission to confinement given membership in a jurisdiction's resident population, the greater the proportion of the residents in the jurisdiction who will be confined at least once over a given period of time. This

relationship probably holds true, but it is not necessarily true: A high chance of imprisonment could represent repetitive imprisonment and reimprisonment of a relatively small proportion of the resident population or it could represent mostly one-time imprisonments of a larger proportion of the resident population. The importance of a prevalence measure is that it tells us how widespread the experience of confinement is in a given population cohort.

Estimate from Cross-Sectional Data

The computation of an exact measure of the prevalence of imprisonment for an age cohort in the general population of a jurisdiction would require an enormous data collection effort, well beyond anything attempted to date. In a highly mobile society such as ours, keeping track of people in the cohort who leave the jurisdiction and who might be admitted to imprisonment in some other jurisdiction would be an expensive, complex, error-prone task.* However, it is questionable whether the cost of such an undertaking could be justified by any possible improvements in the accuracy of prevalence measurements beyond the estimates that can be produced from existing data.

There are several approaches that can be taken to the estimation of the prevalence of imprisonment. For example, in an unpublished paper, Greenfeld (1981b) relied on data about age and prior confinement from the cross-sectional sample of state prison

*If the purpose were to produce an exact measure of the prevalence of incarceration or institutionalization, the difficulties would be even less surmountable.

inmates interviewed in 1974 as part of the National Prisoner Statistics program. Because 97 percent of the interviewed inmates were males, Greenfeld made prevalence estimates for only the male population; however, he made separate estimates for white and black males. For each inmate, the data set contained information about the number of prior confinement sentences served in state, local, or federal adult or juvenile facilities; inmate ages were grouped into five categories.

Greenfeld made the important assumption that the age, race, and prior confinement distributions found among inmates confined on the survey date in 1974 were similar to the age, race, and prior confinement characteristics of the 167,509 persons admitted to state prisons in 1974. Using this assumption, he estimated the numbers of male, white male, and black male admittees falling into five age categories.

For each age category of confined inmates, Greenfeld determined the proportion who were serving their first sentence of confinement. This proportion was then applied to the estimated number of first-time admissions in the age group. The resulting number was divided by the total number of males in the same age group in the U.S. population to produce a rate of first imprisonment for the age group. For example, Greenfeld estimated that 30,655 18 to 21 year old males were admitted to state prisons in 1974. Among inmates in the same age group who were confined on the date of the 1974 NPS survey, 39 percent were serving their first sentence to confinement. Applying this percentage to the

admittees, Greenfeld estimated that 11,955 of the admittees were first admissions. Dividing 11,955 by the 1974 Census Bureau estimate of 7,970,000 18 to 21 year old males in the U.S. population, he arrived at a first imprisonment rate of 0.15 per 100 for this age group.

Under the further assumption that the 0.15 rate for the 18 to 21 age category applies equally to the 18, 19, 20, and 21 year old males within the category, Greenfeld estimated the cumulative prevalence of first imprisonment for males to be 0.60 per 100 from age 18 through age 21. He made similar computations for each of the other four categories and repeated the analysis for white and black males separately.

The results of Greenfeld's analyses are displayed in Table 22. His final estimate is that U.S. males have a probability of .0307 of being imprisoned at least once between the ages of 18 and 64 -- a 3.07 percent prevalence of imprisonment. However, the prevalence of imprisonment for black males (14.30) percent) is about eight and one-half times greater than the prevalence for white males (1.69).

There are a number of criticisms that can be directed at Greenfeld's estimation procedure. First, it uses cross-sectional data to estimate a longitudinal process, requiring the assumption that the imprisonment practices extant in 1974 are constant over time. Second, it assumes that certain characteristics -- age, race, and prior confinement record -- of prisoners confined on a

TABLE 22

Estimates of the Prevalence of at Least One Imprisonment Among U.S. Males, By Age and Race, Derived from 1974 Survey of State Prison Inmates

Race and Age of Males	Estimated Number Admitted on First Sentence of Confinement	Number in U.S. Population (in thousands)	First Imprisonment Per 100 in Age Category	Cumulative Prevalence of First Imprisonment In Each Age Category[a]	Cumulative Prevalence of First Imprisonment Across Age Categories
All males					
18-21	11,955	7,970	.15	.60	.60
22-24	9,988	5,295	.19	.57	1.17
25-34	15,428	14,620	.11	1.10	2.27
35-44	4,931	11,089	.04	.40	2.67
45-64	4,166	20,709	.02	.40	3.07
White Males					
18-21	5,560	6,870	.08	.32	.32
22-24	4,056	4,614	.09	.27	.59
25-34	7,472	12,924	.06	.60	1.19
35-44	3,023	9,813	.03	.30	1.49
45-64	2,530	18,656	.01	.20	1.69
Black Males					
18-21	6,215	974	.64	2.56	2.56
22-24	5,833	593	.98	2.94	5.50
25-34	7,854	1,438	.55	5.50	11.00
35-44	1,870	1,108	.17	1.70	12.70
45-64	1,525	1,818	.08	1.60	14.30

[a] Derived by multiplying "First Imprisonment Per 100 in Age Category" by number of years in age category.

SOURCE: Derived from Greenfeld, 1981b: Table V.

certain date are the same for persons admitted to prison over the course of a year.

A third criticism relates to a definitional issue: What type of confinement does the prevalence estimation reflect? Recall that first admissions in each age category were divided by the total number of U.S. males in the category to derive a rate of first imprisonment for each age category. But first imprisonment, in Greenfeld's data, really means first sentenced confinement in a state prison combined with no prior sentences to incarceration because only persons who had not served prior sentences of confinement in state, local, or federal juvenile or adult facilities were counted as first admissions, and only people who had been admitted to a state prison were eligible to be counted. This definition of first imprisonment produces an underestimation of either the prevalence of imprisonment or the prevalence of incarceration, as those terms are defined in this monograph. The prevalence of imprisonment is underestimated because some inmates who are serving their first prison sentences are excluded from the count of first imprisonment on the basis of prior sentenced confinements in jails or juvenile facilities. Yet, the definition is not adequate for estimating the prevalence of incarceration because people who served (or are serving) sentences in jails or juvenile facilities, but who are never admitted to state prisons, will not be counted in the prevalence measure.

The three problems just discussed are the major ones in Greenfeld's analysis that are pertinent to this monograph. Other

problems exist, simply because the data are not perfectly suited for the task attempted. However, the criticisms of the particulars of Greenfeld's estimates are not meant as criticisms of what the work represents: a creative attempt to draw on some of the best available data to estimate an important phenomenon about which little information exists. In fact, the illustration of measuring the prevalence of imprisonment, presented in the following paragraphs, probably contains as many shortcomings (although different ones) as does Greenfeld's analysis.

Estimate from Longitudinal Data

The longitudinal illustration focuses on males in one state who were 16 years old in 1975, and it traces the prison admissions of the cohort through 1980. The New York Department of Correctional Services produces an annual report on the characteristics of new commitments to the state prison system. The report contains a cross-tabulation of admittee age (10 categories in the later reports) by prior adult record. Prior record is divided into four mutually exclusive categories: (1) no prior adult arrest record, (2) arrest record, but no prior commitments to an adult correctional facility, (3) prior commitment to a local correctional facility only, (4) prior commitment to a state or federal correctional facility. For the moment, the data are taken at face value to illustrate their usefulness for estimating the prevalence of imprisonment; later, limitations of the data will be discussed.

The New York report presents the ages of new commitments in categories, three of which are relevant here: 16 to 18, 19 to 20,

and 21 to 24. In the years 1975, 1976, and 1977, our cohort members appear in the first age category; in 1978 and 1979, they appear in the second, and in 1980, they appear in the third. Thus, the task requires estimation of the distribution of each age within its age category. As noted, in the reports' cross-tabulations with age, prior record is comprised of four categories. Only one of those categories -- prior commitment to a state or federal correctional facility -- is relevant here because we are interested in the prevalence of imprisonment. Thus, the second task is to estimate, for each year, the number of new cohort admittees who had previous commitments to state or federal facilities. Deducting these "repeaters" from the cohort admittees produces estimates of the number of new cohort members admitted to prison each year. The results are displayed in Table 23.

For the years 1975 through 1978, it is estimated that 16 to 18 year old admittees were distributed such that 0.23 were age 16, 0.33 were age 17, and 0.44 were age 18. Because the numbers of 16 to 18 year olds with prior state or federal commitments was so small, it was relatively easy to estimate the numbers for 16, 17, and 18 year olds individually. As Table 23 shows, there were 945 admittees in the 16 to 18 age category in 1975, 11 of whom had prior imprisonments. It is estimated that 217 of the 945 were age 16. It is unlikely that any of the 11 who had prior imprisonments were age 16, but for our purposes, it does not matter. In estimating the prevalence of imprisonment between ages 16 and 21, commitments prior to age 16 are irrelevant.

TABLE 23

Data for the Estimation of the Prevalence of Adult Imprisonment Between Ages 16 and 21
For New York State Males Who Were Age 16 in 1975

	Age Category Data			Estimates for Age Cohort				Cumulative Prevalence of Imprisonment Per 100 Males
Year	Category	Number of Admissions	Admittees with Prior Confinements	Age of Cohort Members	Number of Admissions	Admittees with Prior Confinements	First Admissions	
1975	16-18	945	11	16	217	0	217	0.14
1976	16-18	935	8	17	309	3	306	0.33
1977	16-18	1,097	11	18	483	7	476	0.62
1978	19-20	969	91	19	484	41	443	0.90
1979	19-20	1,030	67	20	515	37	478	1.20
1980	21-24	1,775	370	21	497	92	405	1.45
Totals	—	6,751	558	—	2,505	180	2,325	1.45

SOURCE: N.Y. Dept. of Correctional Services, Characteristics of New Commitments (annual report).

In 1976, it is estimated that 309 of the 935 admissions in the 16 to 18 age group were 17 years old and that three of the eight admittees with prior imprisonments were 17. The estimates for 1977, for 18 year olds, followed the same logic as the estimates for 1975 and 1976.

The cohort fell into the 19 to 20 year old category in 1978 and 1979. In this age category, it is assumed that admittees were evenly divided between 19 and 20 year olds, but that 20 year olds were overrepresented among admittees with prior imprisonments. These assumptions produced the estimates in Table 23 for 1978 and 1979. In 1978, 19 year olds were estimated to be half of the 19 to 20 year old admittees but to be about 45 percent of the 19 to 20 year old admittees with prior imprisonments. In 1979, half of the 19 to 20 year old admittees were estimated to be age 20, but about 55 percent of the 19 to 20 year old admittees were estimated to be age 20.*

The 1980 estimate had to deal with a wider age range: 21 to 24. It is assumed that prison admissions peak at ages 21 and 22, and that they decline slowly for 23 and 24 year olds. Under this assumption, 0.28 was used as the proportion of 21 year olds in the

*Actually, in these estimates, the proportion of 19 year old admittees with prior imprisonments in 1978 (0.085) turned out to be higher than the proportion of 20 year old admittees with prior imprisonments in 1979 (0.072), but this occurred because the overall proportion of 19 to 20 year old admittees with prior imprisonments was higher in 1978 than in 1979 (0.094 vs. 0.065).

21 to 24 category,* producing an estimate of 497 admittees who were age 21. Following the assumption that the proportion of admittees with prior imprisonments increases with age, it is estimated that less than 0.28 of those with prior imprisonments would be age 21 -- in this case, about 0.25 of the 370 with prior imprisonments, or 92.

The Census Bureau estimates of the number of 16 year old males in 1975 in New York, 17 year old males in 1976, and so forth, fluctuate around 160,000. This figure has been used as an estimate of the number of males in the cohort throughout the period.

The last column in Table 23 presents prevalence of imprisonment estimates for the male cohort in New York State. An estimated one and one-half percent of New York State males who were age 16 in 1975 were admitted to state prison before their 22nd birthday. The first impression is that this prevalence estimate is much higher than Greenfeld's which arrived at a prevalence of 0.6 percent for 18 to 21 year old males (see Table 22). Some of the difference stems from the fact that the cumulative estimate in Table 23 covers males from age 16 rather than age 18. When the New York estimates are recomputed, starting at age 18 (1977 through 1980 data), the prevalence estimate is 1.13 percent -- a substantial drop from 1.45, but still almost twice as high as Greenfeld's estimate.

*The other proportion estimates were 0.27, 0.25, and 0.20 for 22, 23, 24 year old admittees, but only the 21 year old admittees are relevant here.

Perhaps the major cause of the difference between Greenfeld's figures and those in Table 23 is the definition of first imprisonment. Recall that, in computing the number of inmates in each age category undergoing their first imprisonment, Greenfeld deducted all inmates who had served a previous sentence in a state, federal, or local adult or juvenile facility. The procedure for the New York cohort eliminated only persons who had served a prior sentence in a state or federal adult facility. The results of this difference in definitions is striking. Only 177 of the 1,979 (about 9 percent) admittees in the New York cohort during the years 1977 through 1980 (ages 18 to 21) were classified as having at least one prior imprisonment. In Greenfeld's data, 61 percent of the 18 to 21 year old inmates were classified as having at least one prior confinement (Greenfeld, 1981b: Table IV).

The New York state reports from which the estimates in Table 23 are derived do not present the age and prior record cross-tabulations separately for racial groups. However, race-specific estimates can be made under the assumption that the racial breakdown among the 2,325 cohort admittees who were experiencing their first imprisonment is the same as the breakdown among all admittees to New York state prisons during the 1975 to 1980 period -- in this case, about 50 percent black and 50 percent white (including Hispanics and other racial groups). During the same period, about 15 percent of the cohort males in the New York state resident population were black. Applying these percentages to the 2,325 cohort members experiencing at least one imprisonment and to the 160,000

males in the total cohort, we arrive at prevalence of imprisonment estimates of 4.84 percent for blacks and 0.86 percent for whites between the ages of 16 and 21. Again, both figures are much higher than the race-specific estimates derived by Greenfeld (see Table 22).

The race-specific estimates for the New York cohort show less disparity between blacks and whites in the prevalence of imprisonment than do Greenfeld's. In the 18 to 21 age group, Greenfeld shows prevalence to be eight times higher for blacks than for whites (2.56 vs. 0.32, in Table 22). Between ages 16 and 21 in the New York cohort, the prevalence for blacks is about five and one-half times higher than the prevalence for whites (4.84 vs. 0.86). One possible source of this difference between Greenfeld's results and those for New York is the inclusion of Hispanics among whites in the inmate and population counts. At least in New York, the prevalence of imprisonment among Hispanics is higher than among other ethnic groups classified as white, and about 20 percent of the admittees to New York state prisons between 1975 and 1980 were classified as Puerto Rican (N.Y. Dept. of Correctional Services, annual), while only 7 percent of the inmates in the data set used by Greenfeld were Hispanic (LEAA, 1979b:4). In any event, we should not expect Greenfeld's estimates to correspond closely to those for New York, simply because the New York data describe one highly urban, industrial state, while Greenfeld's pertain to the entire United States.

Earlier, a variety of problems in Greenfeld's analysis were mentioned, and in this section, we have compared the New York prevalence findings with his. This does not mean to imply that the New York estimates are better than Greenfeld's. In fact, a variety of criticisms can be directed at the New York analysis. The most important criticism pertains to a key underlying assumption of the longitudinal analysis -- namely, that the cohort of New York state males consists of the same people in 1975 (at age 16) as in 1980 (at age 21), or at least that arrivals to and departures from the cohort were similar in terms of numbers and imprisonment experiences. This is a tenuous assumption that cannot be tested adequately with available data, and it is an assumption that is more critical to the estimation of prevalence in one state than to the estimation of prevalence in the total United States.

Another limitation of the New York analysis is that it pertains to a relatively brief period -- six years -- in the lives of the cohort members. In attempting to base the analysis on longitudinal data, we run directly into the problem that, in most states, complete and detailed reports of correctional data are relatively recent phenomena. Only by relying on cross-sectional data was Greenfeld able to produce what amount to virtual lifetime estimates of the prevalence of imprisonment.

Thus, both of the examples of estimating the prevalence of imprisonment that have been discussed -- one using cross-sectional data and one using longitudinal data -- are open to serious criticisms. However, once the differences between the two estimation

procedures are taken into account, their results are not inconsistent with each other. Researchers are encouraged to continue to examine the issue of prevalence, and investigations should be increasingly easier to accomplish as correctional data systems "mature" and become more refined. It is also expected that the findings derived from different estimation procedures applied to different data sets will begin to converge, enhancing our understanding of prevalence. On the other hand, a massive, costly attempt to study prevalence through primary data collection does not appear to be justified at this time. But that judgment brings us to questions about the policy implications of the measurement issues that have been discussed and the ways in which the measurement of confinement can be improved to achieve specific research objectives -- and those questions are addressed in the next, and final chapter.

CHAPTER VI

IMPLICATIONS AND RECOMMENDATIONS

The discussions in the five preceding chapters have covered several broad topics relevant to measuring the use of confinement and have drawn on cross-sectional and longitudinal data from national and state levels to examine a variety of specific issues within each of the broad topics. Our journey through the measurement thicket began with criticisms of the traditionally used "rate of imprisonment": the number of persons present in state prisons on a given day, divided by the resident population of the state, multiplied by a constant. It was pointed out that the usefulness of these rates is limited by cross-sectional or longitudinal differences in the compositions of their numerators and denominators. In addition, the proportion of the resident population held in state prisons on a given date might not be the conceptually appropriate measure to use in some studies of the use of confinement.

As a basis for an examination of measurement issues, a set of concepts and definitions was presented in Chapter I. Three levels of inclusiveness contained within the idea of confinement were identified. At the most inclusive level, institutionalization covers all of the facilities in which people are confined under the government's authority. At a middle level of inclusiveness, incarceration includes only confinement facilities that are part of

the criminal (or juvenile) justice system. Finally, imprisonment deals with a subset of the confinement facilities covered by the concept of incarceration -- namely, those facilities to which convicted offenders are sentenced for significant periods of time.

For each level of inclusiveness, two basic types of measures of the use of confinement were defined. Fraction measurs reflect the proportion of a specified base population confined on a given day; chance measures reflect the probability of entering a confinement facility given that one is part of a specified base population. Chapters II, III, and IV were devoted to examinations of the issues involved in constructing numerators and denominators of fraction and chance measures. The issues were illustrated with cross-sectional and longitudinal data. Because information about prisons is more readily available than is information about jails, juvenile facilities, or other types of institutions, most of the illustrations were restricted to the fraction in prison or the chance of imprisonment. However, the same approaches used in the illustrations with prison data could be applied to data from other institutions.

In Chapter V, two other measurements of the use of confinement were discussed: time served and prevalence. The meaning of time served -- the amount of time spent in the type of facility of interest resulting from a single sentencing or commitment decision -- is relatively clear, and prevalence was defined as the probability of experiencing one (or more) confinements over a specified period of time, given membership in a specified cohort. Although the

meanings of the measures are relatively straightforward, both are difficult to translate into indicators because of their processual nature. An example is "cohort problem" involved in measuring time served in prison: A measure of time served based on a release cohort is confounded by the fact that the admission dates of the cohort members will be spread over prior years, during which sentencing practices may have varied, but a measure based on an admission cohort could be affected by changing release practices during the subsequent years in which the admittees are released.

The details and problems of measuring fractions, chances, time served, and prevalence are interesting in their own right. But the ultimate purposes of examining measurement issues are to develop and refine measures that are appropriate for answering various research questions and to find ways in which data systems can be improved so they can provide the input for refined measures. These are the two topics to be discussed in the present chapter.

During the explorations of measurement issues in the preceding chapters, questions relating to how the various measures are applied in analyses have not been avoided. Likewise, in discussing the limitations of existing data sets while trying to construct various measures of the use of confinement, implicit suggestions about ways to improve the data sets have undoubtedly shown through. Nevertheless, in this chapter, some thoughts on applying measures and improving data sets are brought together as a convenient way of summing up the implications of this monograph and providing guideposts to future research.

The remainder of this chapter consists of two major sections. The first section deals with the implications of measurement issues for current research pertaining to the use of confinement. This is accomplished by discussing the general measurement issues involved in cross-sectional and longitudinal research on the use of confinement and then by taking up two specific areas of research: deterrence and incapacitation, and race and incarceration.

The second major section presents several ideas for improving existing data systems in ways that will make the data more amenable to measuring various aspects of the use of confinement. The suggestions are modest. Given the budget constraints existing at all levels of government, recommending implementation of wholly new data systems -- or even wholesale changes in existing data systems -- is unrealistic. Therefore, the suggestions deal with slight modifications in the ways data are collected and some changes in the ways data are presented in published reports.

Research Applications

General Comments

Most research into the use of confinement relies on measures of the use of confinement from several jurisdictions or for a number of time periods within a single jurisdiction. Therefore, it is vital that these multiple measures pertain to a common phenomenon. This warning appears so elementary that it might be viewed as unnecessary. But the discussions in the preceding chapters have illustrated the complex -- often hidden -- ways in which

measures of the use of confinement can subsume different phenomena at different times and in different places.

For example, in Chapter III we discussed various "definitional boundaries" that determine the types of institutions to which confined persons are allocated. Age and sentence length are two definitional boundaries that are very important when attention is focused on penal institutions. Table 5 in Chapter III showed that definitional boundaries can affect fraction measures of states vis-a-vis each other. When two very large states are compared on their fractions in prison (yearend state prison population count divided by total resident population of the state), New York appears to make more extensive use of confinement than does California. But the justice systems of these two states differ in ways that make such a comparison tenuous, at best. For example, New York considers offenders 16 and older adults, while California commits many young adult offenders to its Youth Authority where they are not included within usual counts of state prison populations. In addition, Table 14 in Chapter IV indicated that, while the probabilities of convicted felons receiving prison sentences are similar in California and New York, the probability of receiving a prison or jail sentence is much higher in California then in New York. When these allocational differences are taken into account by including the numbers of persons held in prisons, jails, and juvenile facilities in the numerators of the fraction measures (fractions incarcerated), California's fraction exceeds New York's by a substantial amount (see last column of Table 5).

The California/New York example is relatively extreme because the ranking of California among the states changes so drastically when we move from a narrow measure of the fraction in prison to a more inclusive measure of the fraction incarcerated. But differences in definitional boundaries affect cross-sectional comparisons involving other states too (e.g., compare the figures for North Carolina and Pennsylvania in Table 5).

Even when adjustments are made so that fraction measures are similarly inclusive among jurisdictions, variability along other dimensions can detract from the usefulness of the fractions for comparisons of the use of confinement among jurisdictions. One particularly illusive set of factors that was discussed in Chapter III is the conditions of confinement. When fraction measures are being used as indicators of punitiveness, they can be criticized reasonably for reflecting only the extensiveness of confinement, while the harshness of the confinement experience can vary substantially among jurisdictions (or even among facilities within the same jurisdiction). More appropriate indicators would be fractions weighted by ratings of confinement conditions, but as noted in Chapter III, the measurement of variability in the conditions of confinement is in a rudimentary stage.

All of these cautions about defining numerators for fraction measures also apply to the numerators of chance and prevalence measures and to measures of time served. For example, cross-jurisdictional comparisons of time served in prison are confounded if some of the jurisdictions send convicted offenders with

sentences of six months to prison (as in North Carolina) while others allow sentences of up to 18 or 24 months to be served in local facilities (as in New Jersey and Pennsylvania). Likewise, similar lengths of time served have different implications in jurisdictions with primarily old, overcrowded, violent, maximum security facilites than in jurisdictions where larger proportions of the inmates are housed in modern, spacious, relatively calm, minimum security facilities.

The cautions apply to longitudinal as well as cross-sectional analyses, although the problems are not as pronounced. Over a period of years, statutory changes can produce different allocations of persons among institutions. This happened in the 1960s and 1970s as several states diverted addict-offenders from their criminal justice systems and used civil commitment procedures to place them in special institutions. For example, the California Rehabilitation Center Program (CRC) for narcotic addicts opened in 1961, and its yearend population count increased steadily to more than 3,000 in 1969; after fluctuating around 2,000 during the early to mid 1970s, CRC yearend population declined rapidly from 2,445 in 1976 to 842 in 1980.

Changes in the nature of confinement also occur over time. Awareness of changes in the conditions of confinement is especially relevant for the past decade during which overcrowding has become a primary problem in prisons and jails. Not only has the fraction imprisoned -- and, in at least some jurisdictions, the chance of imprisonment -- increased during the decade, but is is arguable

that the conditions of confinement have deteriorated because of overcrowding.* Thus, increases in the fraction in prison may understate the growth of the use of imprisonment if the concept, "use of imprisonment" is meant to reflect severity as well as extensiveness.

Longitudinal analyses must also be particularly sensitive to possible changes in base populations. As seen earlier, cross-sectional rankings of the states on fraction measures do not change much when the measures are computed with age-sex-specific denominators rather than with total resident populations as denominators; the age and sex distributions of state populations at one point in time do not vary enough to produce differences. But over long periods of time, the age distributions of resident populations can change substantially, so variability in base populations must be considered in longitudinal analyses, especially if the analyses are directed toward producing projections of future confined populations.

Dealing with demographic changes in the base populations of fraction measures is relatively straightforward compared to dealing with the base populations of prevalence, time served, and chance measures. Prevalence and time served measures are inherently longitudinal; both involve identifying and tracking cohorts, so both involve all of the general problems associated with gathering

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*Changes in the internal composition of prison populations -- such as increases in the proportion of younger, more violent offenders and a growth in gang activity -- may also be associated with a decline in the conditions of confinement. See Irwin, 1980.

data about cohorts. In particular, measures of the prevalence of confinement of a given population cohort within a jurisdiction are muddled by migration into and out of the jurisdiction during the time period. While contamination via in and out migration is not really a problem in measuring time served, the meaning of a time served measure varies, depending on whether one uses an admission cohort or a release cohort as the basis for the measure.

With chance measures, a number of issues pertaining to base populations converge. When chance measures use total resident populations (or segments of the resident population) in their numerators, the issues are comparable to those involved in fraction measures. But a full analysis of the chance of confinement requires computation of a string of conditional probabilities with different denominators. Because multiple denominators (e.g., arrests, charges, convictions) are used in analyses of the chances of confinement, special care must be taken to ensure comparability of the data in both cross-sectional and longitudinal research -- there are simply more pieces of information, the composition of which can differ among jurisdictions or change over time.

This section began with a caution about determining that cross-sectional and longitudinal measures of the use of confinement pertain to common phenomena. It was noted that this caution might appear so elementary that it seems unnecessary. But even the brief highlighting of some of the measurement pitfalls in this area should be sufficient to alert every serious researcher that very close examination of one's indicators is necessary to detect problems

of comparability. In fact, there are few indications in the research literature that the measurement problems discussed in this monograph have been considered seriously.

We now turn our attention to a few examples of how the measurement issues examined in this monograph pertain to some areas of current criminal justice research.

Deterrence and Incapacitation

During the past decades, criminal justice research attention has shifted away from the effects of what happens in confinement facilities (e.g., treatment programs, job training, "prisonization") and toward the effectiveness of the use of confinement as a way to reduce crime via deterrence or incapacitation. The discussion of deterrence and incapacitation research in this section is focused narrowly. The numerous, complex issues involved in both areas of research are beyond the scope of this work; the limited purpose here is to point out some of the ways in which fraction, chance, and time served measures are relevant to aggregate-level research on deterrence and incapacitation (see Nagin, 1978; Cook, 1980; and Cohen, 1978 for extended discussions on research relating to deterrence and incapacitation).

Chance of Confinement

Deterrence research has been conducted with data from aggregate and individual levels, and it has drawn on a full range of methodologies. The focus here is on the issues involved in using chance and time served measures as independent variables in assessing the aggregate effects of deterrence cross-sectionally and

longitudinally. Chance and time served measures, of course, are indicators of the probability and the severity of one form of penal sanction.

To measure the deterrent effects of confinement, most aggregate analyses rely on non-transactional indicators of the conditional probabilities associated with the chance of confinement -- e.g., the ratio of NPS counts of prison admissions to UCR counts of arrests. Criticisms of these indicators are not meant as criticisms of the researchers, who can use only the best data available to them; rather, it is hoped that the criticisms will stimulate the production of more appropriate data. In addition, our discussion is limited to the chain of conditional probabilities starting with arrest. The initial probability of arrest given commission of a crime will be ignored because the issues involved in estimating the denominator of that probability -- the number of crimes, which is also the dependent variable in general deterrence research -- are of such complexity that they require a separate examination.

In Chapter IV, the difficulties involved in using non-transactional data to estimate the conditional probabilities associated with the chances of confinement were discussed. When data from a variety of independent sources -- police, prosecutors, courts, prisons -- are pieced together, differing definitions and counting rules will almost certainly confound the analysis. Therefore, deterrence research should, ideally, rely on transactional data. But even when transactional data are available, there are some problems to overcome.

One of the biggest problems relates to the exclusive focus on prisons in research on the deterrent effects of confinement. The California and New York data in Table 14 (Chapter IV) showed quite clearly that some sort of sentence involving confinement in jail is a more likely outcome than a prison sentence for adult felony arrestees. Furthermore, the relative reliance on jail or prison sentences varies among jurisdictions (see Tables 14 and 16) and over time (see Table 18). Compounding the problem of an exclusive focus on prisons in deterrence research is the fact that many crimes are committed by juveniles, only an insignificant few of whom show up as prison admissions. Thus, the chances of being confined as a punishment for committing a crime are not fully captured in analyses that rely on prison admissions; variability in the allocations of offenders to different types of penal institutions -- whether influenced by rule (e.g., requiring that all sentences of six months or more be served in state prisons) or by practice (e.g., using jail sentences more frequently when prisons are overcrowded) -- should be taken into account as the necessary data become available.

Another major problem with using chance measures in deterrence research is cross-sectional or longitudinal variability in the mix of crimes represented in the chance measures. Table 16 in Chapter IV illustrates the differences in chances of imprisonment and incarceration given arrest among four crime types. To the extent that the relative proportions of robbery and larceny, for example, within all felonies vary across jurisdictions or over time, the

use of chance measures based on all felonies as certainty indicators in deterrence research can prove very misleading. Unless the mixes of crimes in the jurisdictions or time periods being examined are substantially similar, deterrence researchers should try to use crime-specific chance measures.

Even analyses based on individual crime types are not problem-free because of the broad variability among events that fall within the same crime type. For example, cross-jurisdictional or longitudinal variability can exist in the proportions of commercial and personal robberies or armed and unarmed robberies within the robbery category. However, this problem can rarely be dealt with at present because few of even the best data sets that are currently available will permit making such fine distinctions within type of crime categories in the construction of chance measures.

A final caution concerning the use of chance measures in deterrence research relates to the conceptualization of the chance of confinement as a series of conditional probabilities. These conditional probabilities can vary independently so that two jurisdictions (or time periods) with similar overall chances of confinement could differ considerably on any given conditional probability in the series. Conversely, two jurisdictions (or time periods) with very dissimilar overall chances of confinement could be similar on one or more of the conditional probabilities. This feature of chance measures raises an interesting issue. While research on the deterrent effects of the chance of confinement usually relies on an overall measure of chance, the various conditional

probabilities subsumed in the overall measure may have different deterrent values. For example, an increase in the conditional probability of formal charging given arrest may have a greater deterrent effect than a proportionately similar increase in the conditional probability of receiving a confinement sentence given conviction.

The reason for expecting that the individual conditional probabilities associated with the overall chance of confinement might differ in deterrent power is that deterrence depends on the perceptions of the people at whom threats are directed -- a continuing problem in deterrence research. In the example just given, the conditional probability of formal charging given arrest represents a more immediate risk to the potential offender than does the conditional probability of receiving a sentence of confinement after after conviction, and perception tends to magnify immediate risks relative to distant ones. Although we realize that data availability places severe constraints on researchers, attempts to dissagregate the overall chance of confinement into its associated conditional probabilities seem warranted in deterrence research.

Time Served

Using measures of time served as indicators of severity of punishment in deterrence research has some special problems. Of course, time served measures are also subject to some of the common problems that have been mentioned for other measures: For example, differences between two jurisdictions in averge time served by people released from prison in a given year may be

attributable to different type of crime mixes in the releasee populations or different rules governing the allocations of convicted offenders to prisons or jails in the two jurisdictions. But there are two problems that pertain especially to time served measures when used in deterrence research.

The first problem derives from what we have called the "cohort problem" in measuring time served. Most deterrence research that uses a measure of time served relies on average time served by prisoners released during a given period. These prisoners, of course, entered confinement during various earlier time periods, perhaps under varying sentencing policies. Therefore, the extent to which the time served by releasees in year t reflects the threat of confinement (in terms of its expected duration) during year t is open to question. On the other hand, there is no way to compute the actual time served by people admitted to confinement during year t until many years later. What deterrence researchers need is a measure of the expected duration of confinement for prisoners who enter confinement during year t. Actually, two measures would be useful: a "real" measure, based on extensive knowledge about the sentencing and release practices of the jurisdiction, and a "perceived" measure, based on the expectations of people at whom the deterrent threat is directed. The shift toward greater determinacy in sentencing practices should make it easier to derive "real" measures of the expected duration of confinement, and in the long run, the shift may bring about a convergence between "real" and "perceived" measures.

The second special problem with using time served as a measure of the severity of punishment in deterrence research is that the duration of confinement reflects only one aspect of the severity of the confinement experience. Variability in the conditions of confinement is particularly important when severity is at issue. As noted earlier, the measurement of variability in conditions of confinement is still in a rudimentary stage. In addition, perceptions about conditions of confinement among people whom the state wishes to deter are virtually unexplored, especially in terms of the relative importance that people attach to the conditions and the duration of confinement as deterrent threats.

In sum, data shortcomings and the issue of reality versus perception of threats limit the indicators of the probability and severity of confinement that are available to researchers investigating deterrence at the aggregate level. Data shortcomings are especially severe for longitudinal research because improvements in criminal justice data systems -- such as the development of Offender Based Transactional Statistics -- are relatively recent.

The area in which correctional data systems have been strongest traditionally is the basic counting of prisoners admitted, discharged, and on hand. These data, however, are more suited for research on incapacitation than on deterrence.

Fraction in Confinement

Most research on the effects of incapacitation on crime has utilized individual-level data: the subsequent arrest records

of a group of offenders are used to estimate how many crimes would have been prevented if the offenders had been kept in confinement during the follow-up period (see, for example, Petersilia and Greenwood, 1978; Van Dine, Dinitz, and Conrad, 1977). At the aggregate level of analysis, some researchers report the cross-sectional association (or lack of association) between state crime rates and fractions in prison, but it is often unclear whether the factor at issue is incapacitation or deterrence (see, for example, Nagel, 1977).

It is possible to use measures of the use of confinement for aggregate level analyses of incapacitative effects. At least one does not have to be concerned about the reality vs. perception problem that plagues deterrence research or the conditions of confinement issue that is so difficult to measure. There are, of course, a variety of other problems in such analyses -- the difficulty of separating the effects of incapacitation and deterrence, and the problem of reciprocal causality between crime rates and the use of confinement are two examples. However, in keeping with the scope of this monograph, attention here is limited to the construction of indicators of the amount of incapacitation that is occurring.

The traditional "rate of imprisonment" -- number of people in prison on a given date, divided by the number of people in the resident population, multiplied by a constant -- is a rough indicator of the amount of incapacitation in a jurisdiction, but it has several shortcomings. First, by limiting attention to prisons, it excludes many people held in confinement (e.g., juveniles, jail inmates),

and this narrowness of focus subjects the indicator to possible distortions associated with variations (or changes) in the definitional boundaries that determine the institutions to which offenders are sent. Second, the one-day population count generally used as the numerator of the traditional "rate of imprisonment" may not reflect adequately the extent to which imprisonment is used during a given time period. For example, a jurisdiction may have similar yearend prison population counts for year t and year t + 1, but the prison population may have risen steadily to the yearend figure during year t, while the population in year t + 1 may have stayed relatively constant through the entire year. In this example, the greater amount of incapacitation occurring in year t + 1 than year t would not be reflected in the yearend population counts.

A more appropriate indicator for the relative extent of incapacitation in a jurisdiction would be a modified fraction measure with total person-days of confinement in the numerator and total potential "street days" in the denominator. Ideally, the numerator would include person-days spent in the full range of criminal justice confinement facilities -- or at least the major ones: prisons, jails, and juvenile institutions. The denominator could be estimated safely by multiplying the number of days in the time period of interest -- a year, a month -- by the number of persons in the resident population (or in a subgroup of the population) at a given point during the time period because changes in the structure of the resident population generally occur slowly in a smooth manner. Exact counts of person-days in confinement would be more difficult

to compile. People in custody on the first day of the time period would be given a score consisting of the number of days between that day and their release dates or the full number of days in the period if they remained in custody throughout the period. For people admitted during the period, scores would consist of the number of days spent in custody before the end of the period. Computations would have to be made for each type of institution.

Actually, estimations of total confinement days over a period of, say, one year would not be too difficult to make for many individual facilities; most prisons, jails, and juvenile facilities record daily population counts for management purposes. The problems come from the need to aggregate the data across all institutions in a jurisdiction for a number of different years or across all institutions in a number of different jurisdictions for the same year.

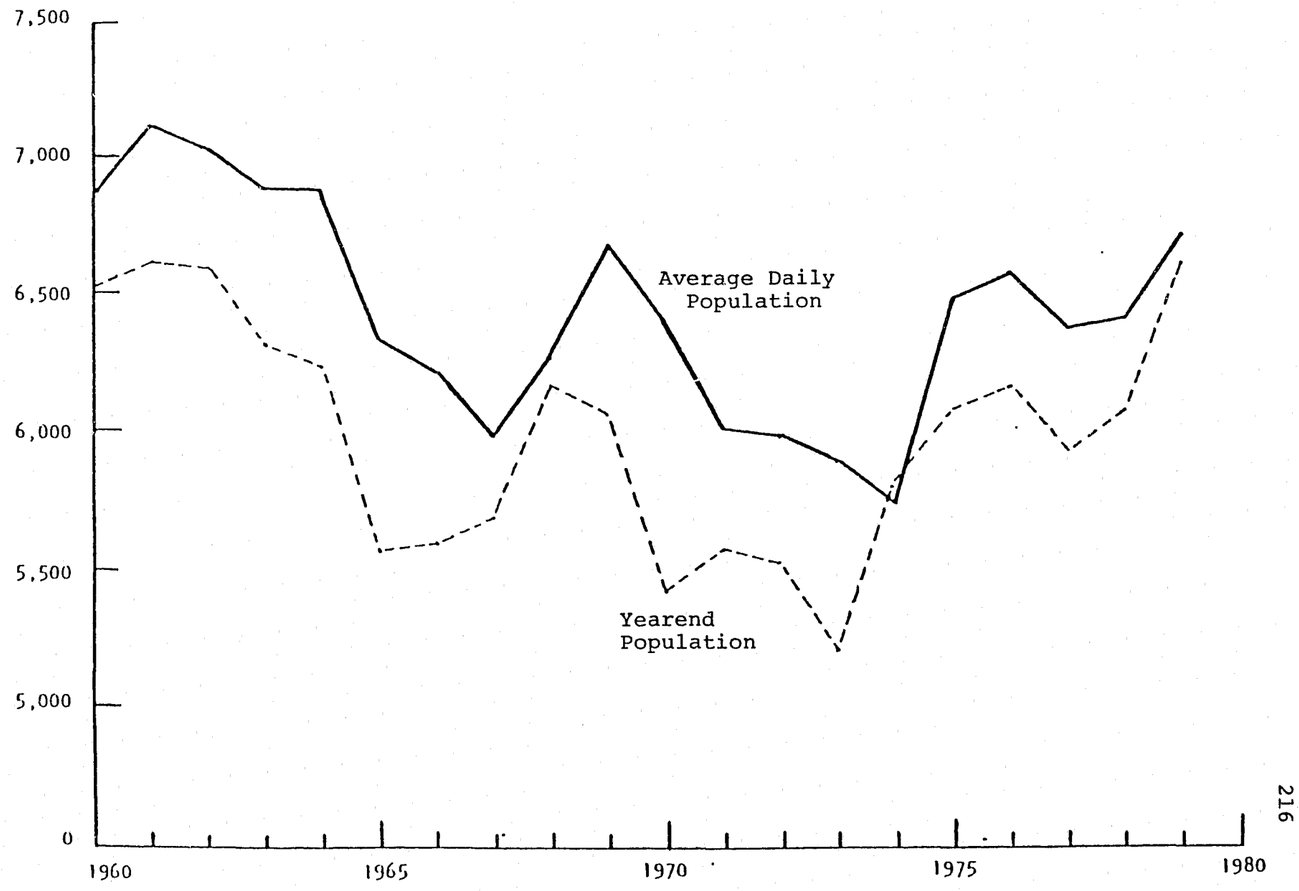
Fortunately, many jurisdictions record -- but do not always publish -- data that can be used to estimate total person-days in confinement: namely, average daily population (ADP). As usually presented, ADP figures consist of the sums of daily population counts divided by the number of days in the year. Multiplying an ADP figure by the number of days in the year produces an estimate of person-days in confinement for the year, under the assumption that each person counted as confined on each day represents one full person-day of confinement. Obviously, there are some potential problems with the assumption. For example, some persons included in a given day's population count may have spent only an hour or two in confinement on that day. In addition, the criteria for who

is counted as being in the day's population may vary over time and across jurisdictions: including or excluding people on work release or furlough, for example. But these problems also affect yearend population counts when they are used as basis for estimating person-days in confinement, and yearend counts have the previously noted drawback of not being sensitive to fluctuations in size of the confined population during the year.

Figure 9, reproduced from a Pennsylvania report (Pa. Commission on Crime and Delinquency, 1980:112), illustrates the differences that can result when ADP counts and yearend population counts are used as bases for estimating total person-days in confinement. The data in Figure 9 pertain to local facilities in Pennsylvania (county prisons and jails). The solid line traces ADP counts for each year from 1960 through 1979; the dashed line tracks yearend population counts for the same facilities over the same time period. Although the two lines reflect similar overall trends, they are far from parallel. Interestingly, yearend population counts are lower than the ADP counts in every year but one, indicating that the total person-days in confinement would usually be underestimated if the estimates were derived from yearend population counts. But the size of the overestimation would vary from year to year because the vertical distance between the two lines in Figure 9 is not constant from year to year. Finally, there are even some differences in the direction of change from one year to another between the two measures displayed in Figure 9. For example, between 1965 and 1967, ADP in the local facilities dropped

FIGURE 9

Average Daily Populations and Yearend Populations of Pennsylvania County Prisons and Jails, 1960-1979



Source: Reprinted from Pa. Commission on Crime and Delinquency, 1980, p. 112.

while yearend population counts rose, and between 1968 and 1969, the opposite pattern is evident.

The average daily population count appears to be a useful piece of data from which estimates of person-days in confinement can be derived for aggregate-level research on incapacitation. Moreover, average daily population counts are recorded routinely for virtually every confinement facility associated with the criminal and juvenile justice systems. Compared to other data collection difficulities pertaining to various measures of the use of confinement, finding ways to assemble ADP counts from prisons, jails, and juvenile facilities in a jurisdiction does not seem terribly complex.

However, the usefulness of total ADP counts for aggregate-level research on incapacitation extends only so far. Theories of incapacitation do not predict a simple, linear relationship between the numbers of people confined and the numbers of crimes committed. The correct people must be confined, and some types of crime (because of their tendency to be repeated) are more subject to incapacitative effects than are others. Thus, researchers examining incapacitation more deeply would need to know the numbers of inmates in daily counts who were convicted of (or charged with) particular types of crime or who were in certain age groups. This would permit computation of crime-specific and/or age-specific ADPs to be used as bases for estimating the amount of incapacitation occurring for different types of offenders. Again, the information to support these kinds of measures are available in the daily

logs of most criminal justice confinement facilities. But assembly of information with such detail for all facilities in a jurisdiction would present much more difficult problems than would assembly of simple daily population counts from the facilities. An alternative might be to use the distribution of inmate characteristics on a single day as an estimate of the distribution of the characteristics on every day of the year. This alternative is attractive because most jurisdictions already report detailed characteristics of their inmates present on the last day of the calendar year. However, use of this alternative requires the assumption that the distribution among inmates of the characteristic of interest does not vary much during the year -- an assumption that might prove reasonable for prison populations but questionable for jail populations, which have higher turnover rates and are more likely to be influenced by seasonal patterns in criminality and short-term fluctuations in law enforcement and prosecution policies.

Although ADP counts have been discussed as data that might be useful in the study of incapacitation, it seems logical to consider whether ADP counts are generally more suitable for the numerators of fraction measures than are yearend population counts. Fraction measures are often used as if they reflected the general use of confinement during a whole year rather than on a given day in the year, in which case, ADP counts would be more appropriate as numerators (ignoring the fact that the denominators are virtually always point-in-time measures rather than yearly averages). The sensitivity of ADP counts to fluctuations in the sizes of

confined populations over the course of the year makes them more appropriate than yearend counts as numerators.

But analyses using fraction measures often require that numerators be broken down into demographic categories: age, sex, race, and so forth. As noted above, it is difficult to put together breakdowns such as these with ADP counts because the breakdowns for each day in the year have to be identified and then averaged. Thus, using single-day (usually yearend) information for the numerators of subgroup-specific fraction measures may be the only alternative. Again, as discussed earlier, this is not a major problem if the distribution of demographic characteristics in the inmate population does not vary much during the year. If variability in demographic characteristics is slight, then use of yearend rather than ADP counts might overestimate or underestimate absolute sizes of the fractions of various subgroups confined during the year, but it would not have much on the relative size of the fraction for one subgroup vis-a-vis another subgroup.

Race and Incarceration

The issues of differential involvement by racial/ethnic groups in crime and differential representation of racial/ethnic groups at the various stages of the criminal justice system (e.g., arrests, convictions, imprisonment) have been examined and heatedly debated throughout the nation's history (see, for example, Sutherland, 1939:120-130; McNeely and Pope, 1981:9-27). The range of research in this area is enormous, but the focus here is narrow: What do the measurement issues discussed in the previous chapters suggest

about aggregate-level approaches to investigating the reasons for the high percentages of blacks present in the confinement facilities of the criminal/juvenile justice system.

There is no question that the fraction of blacks in prison exceeds the fraction of whites in prison in every state (see Table 1 in Chapter II); differentials are also reflected in the populations of jails and juvenile facilities. This situation if often characterized as showing "disproportionate" rates of imprisonment for blacks (Dunbaugh, 1979; Christianson and Dehais, 1980). Whether one looks at fraction, chance, or prevalence measures, the use of incarceration for blacks is higher than for whites, providing the measures use some count of the general population in their denominators. The measures then tell us that the experience of confinement among blacks is disproportionate to the representation of blacks in the general population, but the measures do not reveal the reasons behind the disproportionality. In particular, they do not indicate -- as is often assumed -- that the disproportionality is the result of racially discriminatory processing within the criminal justice system. Aggregate-level examination of use of incarceration decisions within the justice system requires measures that reflect actual justice system processing decisions -- measures such as time served and the chain of conditional probabilities that comprises the chance of incarceration.

A thorough investigation of racial discrimination in justice system processing would utilize individual case records at each stage in the processing to determine if blacks experience more

negative outcomes than whites, after relevant variables (e.g., seriousness of offense) had been taken into account. Assembling all of the necessary data for a single examination of all of the stages would be a formidable task, although there are a large number of studies that have looked at individual processing stages (particularly sentencing) at various times in various jurisdictions (see F.P. Williams, 1980). The studies have produced somewhat mixed results, but the preponderance of the evidence indicates no overall* racial bias in justice system processing.

Some analysis of possible racial bias in justice system processing leading to incarceration can be conducted with published, aggregate data. One approach, utilized by Blumstein (forthcoming), posits that the overrepresentation of blacks in the prison population, relative to the general population, results from the differential racial distributions among arrestees for the types of crimes in which prison sentences are most often imposed. Blumstein took the proportion of state prisoners in each offense category reported by the National Prisoner Statistics and multiplied each one by the proportion of arrestees who were black in the corresponding crime type, as reported in the Uniform Crime Reports for the same year. This produced, for each crime type, an expected proportion of blacks in the prison population. After summing across offense

*One interesting study of sentencing (Gibson, 1978) found bias among individual judges. But the bias was toward more negative sentencing outcomes for black defendants among some judges and more negative outcomes for white defendants among other judges. When the data were aggregated across judges, racial bias in sentencing was not evident in the jurisdiction.

types, Blumstein found that the expected proportion of blacks among state prison populations was only about six percentage points lower than the actual proportion. There is a need to replicate Blumstein's approach using information from a number of individual states, data about admittees rather than inmates present on a given date, and data about inmates of institutions other than prisons.

Another approach to the same question uses processing data from state Offender-Based Transaction Statistics (OBTS). Of the nearly 10,000 felons newly received from court by California prisons in 1979, about 40 percent were white, 34 percent were black, and 25 percent were Mexican-American (Cal. Dept. of Corrections, 1979:23,25). Because of the ways in which the Census Bureau defines its race and ethnicity categories (people counted as "Spanish origin" can be members of any racial group), exact counts of whites, blacks, and Mexican-Americans are not available from Census Bureau reports. However, it is possible to estimate the percentages of the three groups in the resident population.

About 19 percent of California's 1980 population of nearly 24 million was categorized as Spanish origin by the Census Bureau, and 8 percent was categorized as black.

The Census Bureau uses three major racial categories: white, black, and other. In 1980, California's population was distributed as 76 percent white, 8 percent black, and 16 percent other. The 19 percent of California's population categorized as Spanish origin were distributed among these racial groups, primarily in

the white and other groups. Nationwide, 56 percent of Spanish origin persons were classified as "white" and 40 percent as "other" in the 1980 census (assumedly, the remaining 4 percent were classified as "black"). Using these figures as a guide for reallocating the California population, by deducting Spanish origin persons from the white and black racial groups, produces estimates of 66 percent white, 7 percent black, and 19 percent Spanish origin in the California resident population. To the extent that these estimates are correct and comparable to the categories into which prison admissions are divided, the 1979 chance of imprisonment, given membership in the resident population, was approximately 0.26 per 1,000 for whites, 2.04 per 1,000 for blacks, and 0.54 per 1,000 for Mexican-Americans. These differences in overall chances of imprisonment are very large, and the pertinent question is: At what point (or points) do the differences emerge?

Since the chance of imprisonment has been defined in this monograph as including the full chain of conditional probabilities leading from commission of a crime through entry into prison, a complete analysis of the probabilities would identify the point (or points) at which the overall differences emerge. Unfortunately, the necessary data are not available to estimate the initial conditional probability -- the probability of arrest given commission of a crime -- so we will have to be content with picking up the process at the point of arrest.

Table 24 displays the conditional probabilities associated with the chance of imprisonment process for three racial/ethnic

groups, using California OBTS data on felony arrests disposed of in 1979. Also shown, at each stage in the processing, is the percent distribution of the three racial/ethnic groups (with other groups included in the totals but not displayed in the table).

From the percentages in parentheses in Table 24, it is apparent that the disparity between the proportions of blacks in California's resident population (7 or 8 percent) and its incoming prison population (34 percent of felons newly received during 1979) stems almost entirely from the proportion of blacks among felony arrests disposed of in 1979 (30 percent). In contrast, whites are underrepresented, relative to their proportion in the resident population, at each stage of the processing, while the proportion of Mexican-Americans at each stage is very close to the estimated proportion of Spanish origin persons (19 percent) in the 1980 California resident population.

The conditional probabilities associated with each stage of the processing in Table 24 differ somewhat among the three racial/ethnic groups. For example, the conditional probability of a complaint being filed given arrest is higher for whites than for blacks, but the conditional probability of receiving a prison sentence given conviction is higher for blacks; the conditional probabilities for Mexican-Americans tend to fall between those for blacks and whites. However, the differences among the conditional probabilities are not large enough to produce major changes in the percent distributions of the racial/ethnic groups at the processing stages from arrest onward. In fact, since Table 24 aggregates all

TABLE 24

Branching Process Probabilities for Three Racial/Ethnic Groups And Distribution of Groups at Each Processing Stage; Felony Arrests Disposed of in California, 1979

Probability of:	White n= 79,262 (46%)[a]	Black n= 51,043 (30%)[a]	Mexican-Amer. n= 35,439 (21%)[a]
A. Filing of complaint, given arrest	.802 (49%)	.693 (27%)	.738 (20%)
B. Conviction, given filing of complaint	.758 (49%)	.736 (27%)	.775 (21%)
C. Prison sentence[b] given conviction	.095 (41%)	.142 (33%)	.122 (22%)
D. Prison or jail sentence,[b] given conviction	.640 (46%)	.757 (29%)	.719 (22%)

[a]Row percentages indicate proportions of cases in racial ethnic groups at each processing stage. Percentages do not sum to 100 because other racial/ethnic groups and arrestees whose racial/ethnic group was unknown (n= 5,236) are not displayed separately.

[b]Prison sentences include sentences to prison, death, Youth Authority, California Rehabilitation Center, and state hospitals for mentally disordered sex offenders. Jail sentences include sentences that combine jail and probation.

Source: Cal. Dept. of Justice, 1980b:42.

felony arrests, some differences in conditional probabilities should be expected; the distribution of racial/ethnic groups differs by type of crime among arrestees (see Cal. Dept. of Justice, 1979:112).

The discussions of Blumstein's analysis and the data in Table 24 suggest that the disproportional representation of some racial/ethnic groups (particularly blacks) in prison -- relative to the representation of those groups in the general population -- is not created by large differences in post-arrest processing. It is, of course, possible that the conditional probabilities of arrest given commission of a crime differ substantially across racial/ethnic groups; that issue cannot be addressed adequately with available data. However, it seems more likely that the racial/ethnic distributions in criminal justice system institutions derive from the fact that the criminal justice system concentrates its energies on a less than complete range of illegal behavior (e.g., tax evaders and "fee-splitters" are rarely arrested by local or state police), and racial/ethnic groups differ in their levels of involvement in various types of illegal behavior because of economic status and opportunity.

Improving Existing Data

As pointed out at the beginning of this chapter, it is unrealistic to recommend the development of new data collection systems or the implementation of major changes in existing systems at this point in time; the economic resources of criminal justice agencies

cannot support such efforts currently. Scarcity of funding also means that most research conducted on use of confinement issues will consist of relatively small projects that rely heavily on published data from state and federal agencies. Recognizing these constraints, this monograph has used readily available information to illustrate the measurement issues that have been discussed.

However, the necessity of relying heavily on published agency reports should not be a cause for despair. There are a number of states with excellent reporting systems; improvements in data systems have been made steadily at the state and national levels, particularly during the past decade; and there are a variety of unanswered questions relating to the use of confinement that researchers can address with relatively limited resources and access to published data (or the ability to access existing raw data files for a few, limited analytical runs).

In this closing section of the monograph several suggestions for refining existing data reporting systems are brought together. The suggestions relate to issues that have cropped up during the course of the discussions in the preceding chapters. There is no claim that the suggestions represent anything like a comprehensive plan for refining data systems that deal with the use of confinement.

Fraction Measures

The information needed for the computation of the numerators of fraction measures is much more readily available than is the information needed for the components of other measures of the

use of confinement. Therefore, only two minor suggestions are made: (1) including average daily population counts in published reports, even when detailed characteristics of confined populations are presented only for yearend populations, and (2) specifying the parameters of the confined population, especially if its content is affected by definitional boundaries that are not common among a majority of jurisdictions -- for example, when relatively long-term sentences are served in local facilities, or when large numbers of youthful offenders are counted in a separate system.

There are a number of other data system refinements and changes that would aid in the construction and analysis of fraction measures. However, some of these apply equally to other measures (and are discussed a little later), while others relate to issues on which further research is needed before refinements or changes can be suggested (e.g., the whole issue of conditions of confinement).

Chance Measures

The best hope for data relating to the conditional probabilities associated with the use of incarceration is in the continued development of systems such as Offender-Based Transaction Statistics (OBTS). The Bureau of Justice Statistics and the National Association of State Statistical Analysis Center Directors are playing important roles in encouraging the development and standardization of these systems (see, for example, Folan and Lettre, 1981).

In Chapter IV, a few points pertaining to limitations of OBTS systems were noted: for example, the issue of how missing data is handled and the importance of information about suspensions of sentences to confinement. However, at least there are groups involved in monitoring the development of OBTS systems, providing a framework for the sharing of experiences and knowledge. Although shortages of resources will affect the development of OBTS-type systems, the continued improvement of these systems appears more certain than the improvement of some other data systems.

Time Served

One primary improvement in reporting time served that could be made by state correctional agencies is the use of admission as well as release cohorts. There is an understandable tendency for annual reports to focus on information that deals with the current year -- or at least on trend information that includes the current year. By its very nature, time served information about admission cohorts is always somewhat "out of date," but it provides the basis for the only experienced-based measure of time served by people who entered confinement under common sentencing practices.

In Chapter V, the importance of reporting time served separately for people in different release categories was noted. However, this does not apply only to first release and re-release as a dichotomy. For persons being re-released after having been returned from community supervision, it would be useful to have separate tabulations of time served for those returned with and without new convictions.

Whenever possible, it would also be useful to provide separate tabulations of time served that include periods spent in jail awaiting trial, sentencing, or transfer -- at least those periods that relate directly to the offense for which the person entered prison. This more inclusive measure of time served would not be a replacement for the usual presentations of time served in prison, for example, because the "standard" presentations are often used in comparison to sentence length, and such comparisons would not be valid if jail time were included in the time served computation (except to the extent that inmates are given credits on their sentences for time spent in jail, but this should be dealt with separately).

Finally, what may seem like an unnecessary suggestion: What is meant by "average" time served should be specified. There are still some reports in which it is unclear whether a median or mean is being used.

Prevalence

The only way that prevalence estimates can be derived from published reports is if the reports contain cross-tabulations on age and prior incarceration experiences of admittees. More in-depth investigation of prevalence requires multivariate cross-tabulations that add factors such as type of crime, place of residence, race, sex, and so forth. It is unreasonable to ask that numerous, additional, complex tabulations be included in agency reports just so that prevalence questions can be examined. Therefore, researchers will have to rely on secondary analysis of raw data files to pursue issues relating to prevalence.

General Comments

It seems appropriate to conclude this monograph with general suggestions pertaining to two issues which have arisen time and again in the preceding chapters: comparability and inclusiveness.

The problem of comparability applies mostly to the cross-sectional use of data. This does not mean that comparability problems are not present in longitudinal data sets for a single jurisdiction. But the sources of comparability problems in longitudinal data sets are often attempts to improve the data sets -- as was seen in the examination of California data in Chapter IV--- and those efforts should not be discouraged.

For cross-sectional data, the problem is more difficult to deal with. One solution is nationally centralized data systems such as the National Prisoner Statistics and the Uniform Parole Reports. But these systems must trade off a some degree of detail in order to obtain full, standardized coverage. In other words, the systems must keep reporting demands on local jurisdictions to a minimum in order to retain cooperation. Another solution is the involvement of organizations such as the National Association of State Statistical Analysis Center Directors, through which people responsible for data systems at the state level can share ideas and techniques. This approach to creating more comparability in state and local data systems could be extended by way of the American Correctional Association, the National Sheriffs' Association, and other organizations.

Some degree of cross-sectional comparability in agency reports can be attained without the involvement of federal agencies or national organizations. Those responsible for producing reports can examine reports from other jurisdictions to determine where comparability problems arise, and they can, to some extent, disaggregate their data more completely than at present so that comparable categories can be constructed by others. Several states, for example, present the age characteristics of their yearend prison populations in discrete age levels rather than age categories, at least for inmates below age 35 or 40. However, there are some comparability problems -- such as categorization of inmates into racial/ethnic groups -- the complexity of which requires centralized standardization or coordination through a national organization.

The problem of inclusiveness is the one that has forced this monograph to deal mostly with the use of imprisonment, occasionally with the use of incarceration, and only rarely with the use of institutionalization. Of course, the problems of comparability and inclusiveness are highly interrelated: Data describing the numbers and characteristics of people entering and residing in a range of different types of institutions, for example, must have some degree of standardization if they are to be combined for meaningful analysis.

It is well beyond the scope of the research on which this monograph is based to delve into questions such as how to improve data sets that pertain to the processes by which people enter

facilities other than those associated with the criminal/juvenile justice system. But even within the justice system itself, there are enormous gaps in our knowledge about the use of incarceration that cannot be filled without more detailed knowledge of the populations of jails and juvenile facilities and of the conditional probabilities describing the chances of entering jails and juvenile facilities. There have been many occasions throughout this monograph in which it has been necessary to restrain the temptation to draw broad substantive conclusions from the illustrations presented because the illustrations did not cover confinement in facilities other than state prisons. When illustrations did include data about jails and/or juvenile facilities -- such as in the discussions of definitional boundaries in Chapter III and of state OBTS data in Chapter IV -- the conclusions reached were affected significantly.

It is understandable that improvements should be made first in those data systems that pertain to prisons and to the processing of adult felony offenders; these are the areas of most serious social concern. Some states do publish reports about the populations of and admissions to jails and juvenile facilities, and the national reporting systems in these areas -- jail data through the National Prisoner Statistics and data about juveniles through the Children in Custody series -- are helpful. It is also true that the development of data systems pertaining to jails and juvenile facilities faces some special problems: the multiplicity of jails that maintain independent records and the special problems of confidentiality with juveniles, for example. However, at some point, increased

attention will have to be given to developing data systems describing the routes to and the populations of jails and juvenile facilities. The enormous numbers of people undergoing confinement in jails and juvenile facilities are simply too large to be ignored in important public policy analysis of questions such as incapacitation, deterrence, and the effects of confinement on employability. The best advice that can be given to researchers studying the use of confinement in the justice system is to strive to incorporate data from the full range of justice system facilities in their analyses whenever possible; as the results of more inclusive analyses become available, the shortcomings of findings based solely on prison data will become more and more evident.

The comments on the issue of inclusiveness brings us back to Chapter I where the concepts of imprisonment, incarceration, and institutionalization were first presented. During the monograph, a variety of issues pertaining to the measurement of the use of confinement have been raised, discussed, illustrated, but hardly ever settled. In this sense, the monograph represents a series of challenges rather than statements. However, to those committed to the idea that careful empirical analysis can help to produce realistic public policy, the challenges should be acceptable because careful empirical analysis must be based in careful measurement.

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