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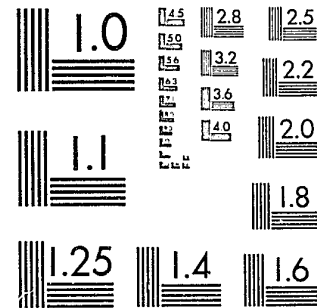
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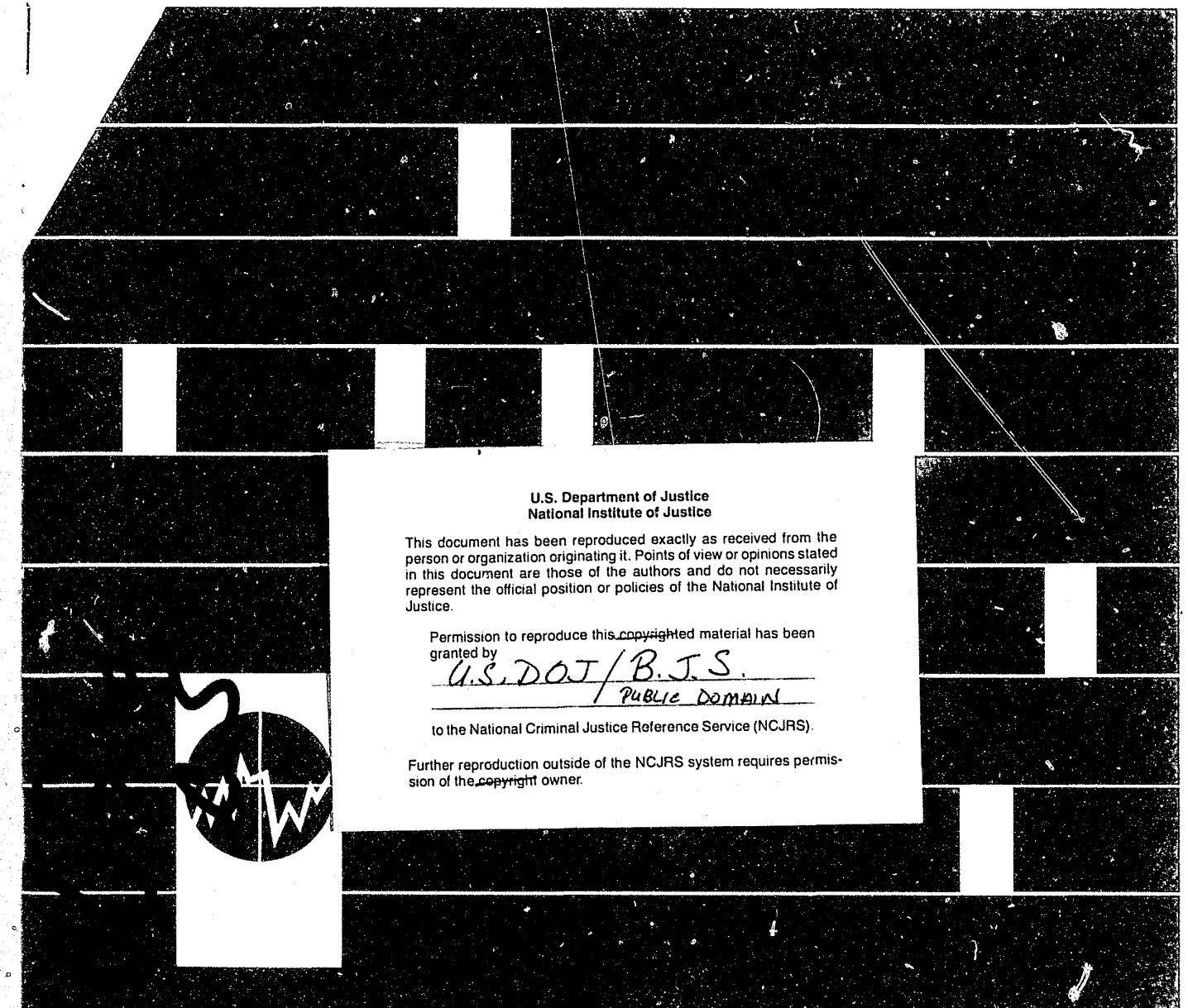
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Patterns of Robbery Characteristics and Their Occurrence Among Social Areas

U.S. DEPARTMENT OF JUSTICE   Law Enforcement Assistance Administration
National Criminal Justice Information and Statistics Service
UTILIZATION OF CRIMINAL JUSTICE STATISTICS   ANALYTIC REPORT 15

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PATTERNS OF ROBBERY CHARACTERISTICS
And Their Occurrence Among Social Areas

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CRIMINAL JUSTICE RESEARCH CENTER
Albany, New York

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THE UTILIZATION OF CRIMINAL JUSTICE STATISTICS Project was funded initially in 1972 by the National Criminal Justice Information and Statistics Service of the Law Enforcement Assistance Administration. One primary aim of the project is the production of annual editions of the Sourcebook of Criminal Justice Statistics, a compilation of available nationwide criminal justice statistical data. A second aim has been and continues to be an examination of the utility that a variety of criminal justice statistical data bases have for addressing questions of practical and theoretical interest in the field.

One product of that examination is a series of analytic reports, of which this volume is one. These reports, written by research staff members of the Utilization of Criminal Justice Statistics Project, all have a common theme: the discussion of a central criminal justice topic using an exemplary or innovative criminal justice data base. Each report in the series not only discusses substantive findings in regard to particular issues, but also considers the qualities and limitations of the data, as well as techniques and problems of analysis, in relation to the substantive findings.

At a time when criminal justice statistics development is extensive, and often expensive, these analytic reports focus attention on one often overlooked function of criminal justice statistics—the analysis of current issues and questions based on available data. In fact, the utilization issue is perhaps as important as any in the area of criminal justice statistics. It often happens that data are collected—usually at great expense—without subsequent efforts to utilize such data to address the pressing problems that confront criminal justice. This series of Analytic Reports explores the problems and prospects inherent in the application of various sources of criminal justice statistical data to issues of interest and concern to agency personnel, planners, researchers, and the public alike.

MICHAEL J. HINDELANG
Project Director

ACKNOWLEDGMENTS

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Introduction

THIS PAPER CONTINUES an analytic framework presented in an earlier report (Dunn, 1976) in this series. In the earlier paper, it was demonstrated that some characteristics of aggravated assaults—for example, race of offender and victim, means of attack, and site of occurrence—varied considerably among types of social areas within a metropolitan county.[1] In certain instances, the variation in an assault characteristic corresponded to variation in one or more geosocial attributes. That is to say, there was an association between an offense characteristic and an area attribute. For example, race of offender and victim in assault incidents was strongly related to the racial structure of the population and to the level of social problems. Black/other offender, black/other victim assaults

tended to occur predominantly in areas having substantial concentrations of persons of black and other races and substantial levels of situations often defined as social problems (e.g., broken homes, poverty, unemployment). On the other hand, white offender/white victim assaults tended to occur in predominantly white, lower-middle or working-class social areas having moderate social problem levels.

This report presents a similar analysis for the offense of robbery. The patterns and relationships between two basic dimensions of robbery occurrence are examined. Robbery, as well as most other traditional criminal offenses, can be viewed as having two basic dimensions: an attribute dimension, referring to the basic characteristics of robbery incidents; and a spatial dimension, referring to characteristics of the areas in which the incident occurred. The objective of this report is to examine associations that may exist between the attributes of robberies and characteristics of the areas in which robberies occur.

In the earlier paper, it was indicated that the patterns of geosocial distribution of assault characteristics were, very possibly, important examples of social and cultural differentiation processes at work in different

[1] C.S. Dunn, **The Patterns and Distribution of Assault Incident Characteristics Among Social Areas**, Analytic Report SD-AR-14 (Washington, D.C.: U.S. Department of Justice, Law Enforcement Assistance Administration, National Criminal Justice Information and Statistics Service, 1976), pp. 16-22.

areas. The different patterns of incident characteristics, it was argued, might stem from cultural and behavioral differences among areas that are difficult to measure, categorize, or investigate directly.

Parallel findings were discovered about the occurrence of robberies and the geosocial distribution of their characteristics. Interestingly, there are some associations of robbery characteristics and area attributes that are unique; in other words, associations among analogous assault characteristics and area attributes indicated a different pattern of occurrence. However, the basic point of investigation is again substantiated—namely that *characteristics* of offenses, as well as rates, vary among different geosocial areas, often in association with particular area attributes.

Characteristics of Robberies

The offense of robbery is defined for nationwide crime reporting purposes as "the taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear."[2] Often, however, official statistics about robbery, or studies that extract information from police records, are more specific and detailed concerning the characteristics of robberies. For example, for crime reporting purposes, robbery is divided into four subgroups, based on the nature of threatened or applied force: (1) firearm, (2) knife or instrument, (3) other dangerous weapon, and (4) strongarm (hands, fists, feet, etc.).

McClintock and Gibson (1961) identified five groupings of robbery incidents based primarily on the role and location of the victim at the time of the offense. Robberies in London occurring in 1950 and 1957 were classified according to differences in those characteristics. Normandeau (1968) also used the McClintock/Gibson typology to examine the distribution of robbery in Philadelphia.

Table 1 presents the distribution of the McClintock/Gibson robbery types as observed in London and Philadelphia. Robbery Group I consists of robberies of persons who, as part of their employment, were in

[2]C.M. Kelley, **Uniform Crime Reporting Handbook** (Federal Bureau of Investigation, U.S. Department of Justice, 1974), p. 14.

charge of money or goods. In London, about 36 percent of robberies (from two different years, 1950 and 1957) involved such a pattern, while in Philadelphia (over a 7-year period, 1960 to 1966) robberies in this group were about 26 percent of all robberies. A second pattern was defined as robberies occurring in the open following sudden attack. In London, about 36 percent of robberies involved this pattern, whereas such robberies in Philadelphia were about 52 percent of all robberies. Robbery Group III involved robberies on private premises and generally were perpetrated by offenders who knocked and forcibly entered after a door was opened, or housebreakers who were subsequently surprised by a member of the household. Robberies of this type in London and Philadelphia differed in relative proportion only slightly—about 10 percent in London versus 7 percent in Philadelphia. A fourth group was identified as robberies that occurred after preliminary association of short duration between victim and offender, for example, of a victim decoyed by a prostitute, of a prostitute by a client, or of a victim in the vicinity of a bar after drinking with the offender. Such robberies occurred in similar proportion in London (about 14 percent) and in Philadelphia (about 10 percent). The fifth group identified by McClintock and Gibson, robberies of victims having previous association of some duration with the offender (e.g., lovers, coworkers), also had similar, but quite small, relative frequencies in London and in Philadelphia—about 4 percent.

Conklin (1972) created another basis for robbery classification that incorporated different characteristics. Instead of classifying occurrences of robbery as did McClintock and Gibson, and Normandeau, Conklin identified types of robbery offenders based on interviews of convicted robbers in Massachusetts. The bases for classification were the motivation for the theft, the techniques used, and the degree of individual commitment to crime as a way of life.

Four different kinds of robbers were identified from the results of interviews with 67 persons convicted of robbery and with 90 victims. The *professional* robber was described as one who was involved in relatively careful planning of a "job," usually with accomplices who had different roles during the incident. Relatively large sums of money were often sought. Such robbers commonly carried weapons, usually loaded firearms, during the incident, but left weapons at home at other times. These robbers were usually white persons, and tended to be in their mid-20's and 30's. Often they were

	Robbery group	LONDON[a] (N=749)	PHILADELPHIA[b] (N=1,732)
I.	Robbery of persons who, as part of their employment, were in charge of money or goods	35.9	25.8
II.	Robbery in the open following sudden attack	36.0	52.2
III.	Robbery on private premises	10.0	7.3
IV.	Robbery after preliminary association of short duration between victim and offender	14.3	10.2
V.	Robbery in cases of previous association of some duration between victim and offender	3.7	4.5
	Total[c]	100.0	100.0

TABLE 1 Types of robbery incidents in London and Philadelphia

[In percent]

[a]Source: McClintock and Gibson, 1961, p. 16, Table 6. These percents are derived from the totals of robberies in 2 years (1950, 1957).

[b]Source: Normandeau, 1968, p. 120, Table 41. These percents are derived from data for a 7-year period, 1960-1966.

[c]Percentages may not sum to 100 percent because of rounding.

from middle- or working-class backgrounds. They usually reflected what was described as a hedonistic life style supported by a long-term commitment to crime to attain and maintain a desired material status.

A second group of robbers was described as *opportunists*. These persons were engaged in robberies that occurred in relatively random fashion, but usually involved attacks on apparently vulnerable victims, often alone, carrying small sums of money. Such persons were often black, in their teens or early 20's, and often from lower-class backgrounds. Their motives for obtaining money and the small amounts obtained reflected similar intentions but much lower levels of

aspiration than those of the professional robber. Conklin (1972:68) indicated that such robbery offenders are probably the most common.

A third type of robber was described as the *addict* robber, reflecting that such persons committed robberies primarily to finance a drug habit. The addict robber usually had a low commitment to robbery as a means of obtaining money, but a relatively high commitment to theft. Incidents committed by these persons reflected some degree of planning and occasional use of weapons (but rarely firearms). However, the frequent absence of a weapon often increased the likelihood that physical force was used to intimidate a victim. The ad-

dict robber reflected a long-term commitment to the use of drugs, with some type of crime forming the source of revenue; robbery was a fast and direct source of cash.

The fourth type of robbery offender described by Conklin was the *alcoholic* robber. Persons in this group robbed for reasons usually related to excessive consumption of alcohol. Often they exhibited some characteristics of the opportunist and some of the addict. That is, they often robbed only to get a little extra money for drink, or as the opportunity presented itself, for example, subsequent to an assault on some other drinker or passer-by.

Conklin was unable to determine empirically the relative distribution of each type of robber in the population he studied. However, he did examine the distribution of characteristics of robberies. It may therefore be possible to infer certain relationships between types of robbers and characteristics of robberies.

For example, Conklin pointed out that the professional robber often robbed relatively larger sums of money than the other types. Because 83.3 percent and 94.0 percent of the 1964 and 1968 robberies, respectively, identified as robberies of large commercial establishments such as banks and stores, involved the theft of $100 or more, one might tentatively conclude that some aspects of the professional robber pattern are related to robberies of large commercial establishments.[3] Another example is the finding that youthful offenders or blacks commit purse-snatches and street robberies, which net relatively small amounts, more often than adults or whites who, in contrast, commit commercial robberies relatively more frequently. Therefore, these distributions of incident characteristics are, according to Conklin, "consistent with the fact that offenders who are young [or] black are likely to be *opportunists* who steal from vulnerable victims and net small gains, while older [or] white offenders are more apt to be *professionals* who plan their crimes and steal large sums of money."[4]

Of interest in addition to the characteristics included in the McClintock/Gibson and Conklin typologies are the race and sex of robbery offenders and victims, as well as the means of attack, and specific location of occurrence. Normandeau (1968) found that

63 percent of the robberies in his sample were committed by blacks against blacks, 13 percent were committed by whites against whites, 23 percent by blacks against whites, and 1 percent by whites against blacks.[5] Robbery offenders were predominantly male, around 95 percent; while sex of the victim was somewhat more varied, about 75 percent male and 25 percent female.[6]

Normandeau also presented data pertaining to means of attack. In general, these data indicate that offenders threatened male victims more often with firearms, females more often with physical intimidation. White males used firearms much more often than blacks. White victims generally suffered less harm than blacks; they often put up much less resistance than blacks. In general, the younger the offender, the more often he used physical tactics; the older the offender, the more often he was armed.

Normandeau presents some interesting data that contrast the means of intimidation used by the offender with the force that actually harmed the victim. He found that the means of intimidation (as shown in part of Table 2) were: firearms, 32.4 percent; sharp instruments, 8.5 percent; blunt instruments, 9.9 percent; physical means, 37.5 percent; verbal threat, 4.5 percent; only pushed or not intimidated, 7.2 percent. The actual means used to inflict injury differs dramatically. Only slightly over 1 percent (1.3 percent) of the victims were actually harmed by firearms, 2.7 percent were harmed by sharp instruments, 3.3 percent by blunt instruments, and 48.8 percent by physical tactics; 43.9 percent were not harmed at all. Summary data from the present study (also shown in Table 2 and discussed in detail below) indicate marginal frequencies comparable to Normandeau's data on means of intimidation.

Another important characteristic of robbery examined in the three earlier studies and the present study is the nature of the location at which the offense occurred. Table 3 presents the proportion of robberies occurring in various locations for London, Philadelphia, Boston, and Westchester County, New York. The largest proportion of robberies in each city occurred on the street. The next most frequent place of occurrence was some sort of commercial establishment. A surprisingly large proportion of robberies in Boston were cab robberies, compared to the proportion of

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[3] J.E. Conklin, **Robbery and the Criminal Justice System** (Philadelphia: J.B. Lippincott Company, 1972).

[4] Ibid., pp. 82-83. Emphasis added.

[5] A. Normandeau, "Trends and Patterns in Crimes of Robbery" (Ph.D. Dissertation, University of Pennsylvania, 1968).

[6] Ibid., pp. 154-155.

TABLE 2   Means of force or intimidation used in robberies in Philadelphia and Westchester County

[In percent]

| Means of force | PHILADELPHIA[a] | | WESTCHESTER COUNTY[b] |
	Intimidation (N=1,785)	Actual cause of injury (N=1,785)	Reported weapon involved (N=361)
Firearms	32.4	1.3	22.5
Knife (sharp instrument)	8.5 ⎫	2.7	19.4
	⎬ 18.4		
Blunt instrument	9.9 ⎭	3.3	NA[c]
Bodily force	37.5	48.8	29.3
Verbal threat	4.5	NA	5.6
Pushing, snatching, no intimidation (or not harmed)	7.2	43.9	6.2
Multiple	NA	NA	17.0
Total	100.0	100.0	100.0

[a] Source: Normandeau, 1968, pp. 199, 201.

[b] Source: Dunn, 1974, p. 334. Percentages based only on sum of cases for which type of weapon was reported.

[c] Note, the sum of Normandeau's categories for sharp and blunt instruments is about the same as the total for knives in Westchester County.

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vehicle robberies in the other cities. The proportion of robberies in residences was higher in London than in the three American locales.

Robbery in Westchester County

It is impossible to present information about the characteristics of robbery in Westchester County, New York that is identical to the information contained in the McClintock/Gibson or the Conklin typologies. No information was collected about the activities of the victims immediately prior to the event, nor were offenders available to be interviewed regarding their modus operandi or prior criminal activity. Comparing sites of robbery occurrences is somewhat easier, as is comparing other individual characteristics such as means of force or weapons, race, sex, and age of robbery offenders and victims.

Using analogous classifications for location of occurrence, robberies in Westchester County, New York (shown in Table 3) were distributed among the following places: street, 49.1 percent; commercial establish-

TABLE 3 Location of robberies

in London, Philadelphia, Boston, and Westchester County

[In percent]

Location	LONDON[a] (N=749)	PHILADELPHIA[b] (N=1,722)	BOSTON[c] (N=1,240)	WESTCHESTER COUNTY[d] (N=407)
Street	54.3	55.8	49.0	49.1
Establishment	25.7	17.8	23.7	27.4
Vehicle (car, taxi, bus)	1.4	4.3	16.1	6.3
Residence	16.7	7.0	7.4	8.9
Other places	1.9	16.1	4.0	8.3
Total[e]	100.0	100.0	100.0	100.0

[a] Source: McClintock and Gibson, 1961. p. 130. Averages of percentages for 2 years (1950, 1957).

[b] Source: Normandeau, 1968, pp. 224-225, p. 244. Averages of percentages over 7-year period (1960-66). Note that the difference in percents reported for London in Normandeau's Table 84 (p. 244) is due to the application of the averaging procedure to the McClintock/Gibson data in order to make it consistent with the data reported by Normandeau in his Table 79 (pp. 224-255) and Table 94 (p. 244). In order to calculate the overall percent distribution of location of robbery, Normandeau simply averaged the percent distributions across the 7 years. This averaging procedure has been reapplied by Dunn to the McClintock/Gibson data for 2 years (1950, 1957) and to the Conklin data for 2 years (1964, 1968).

[c] Source: Conklin, 1972, p. 41. Averages of percentages for 2 years (1964, 1968).

[d] Source: Dunn, 1974, p. 334.

[e] Percentages may not sum to 100 percent because of rounding.

ment, 27.4 percent; car or other vehicle, 6.3 percent; residence, 8.9 percent; and other locations, 8.3 percent.[7] These relative frequencies are similar to those presented for the other cities.

In contrast to Normandeau's findings about means of intimidation (see Table 2), the distribution of means of force in robberies in Westchester County indicated that knives were more frequently involved (19.4 percent). Most other means of force or weapons were less frequent (guns, 22.5 percent; hands/feet, 29.3 percent; no intimidation, 3.4 percent; and snatching, 2.8 percent). Verbal threats were about the same, 5.6 percent. However, about 17 percent of the robberies in Westchester County involved the use of multiple means (not individually distinguished); therefore the percent distribution of threatened or applied force may actually be even more similar to that in Philadelphia.

Normandeau reported a large proportion of black offender/black victim robberies (about 63 percent), a moderate proportion of black offender/white victim robberies (about 23 percent), a small proportion of white offender/white victim robberies (13 percent), and almost no (only 1 percent) white offender/black victim robberies. As shown in Table 4, only the robberies in Westchester County in which whites were offenders have similar frequencies to those in Philadelphia: white offender/white victim robberies were about 15 percent, and white offender, black/other victim robberies only about 3 percent.

In contrast to Philadelphia, there are striking differences in respect to robberies involving black offenders. In Philadelphia, robberies involving black offenders and victims are predominant (63 percent). In Westchester, the opposite is found—black offender/white victim robberies are about 69 percent, while black offender/black victim robberies are only about 14 percent.

[7] See C.S. Dunn, "The Analysis of Environmental Attribute/Crime Incident Characteristic Interrelationships" (Ph.D. Dissertation, State University of New York at Albany, 1974), pp. 101-109, for a complete description of the data base on which this research was focused. Briefly, a 50 percent sample of robbery incidents occurring in Westchester County, New York, in 1970 was compiled resulting in 407 robbery incidents about which detailed, incident characteristic information was recorded from police offense reports. The author conducted secondary analyses of a data base concerning crime in Westchester County. This data base was compiled by the Westchester Community Service Council, Inc., between 1971 and 1973 in connection with another research grant. The reports of the Council pertaining to the data base are found in the list of references.

That difference between robberies in Philadelphia and Westchester County is helpful in demonstrating the purpose of the analysis of within-county differences in Westchester. In particular, it serves as a cogent example of explaining the differences in characteristics of offenses in terms of differences between the places in which those offenses occurred.

The first hypothesis that comes to mind has to do with differences in the racial composition of the population of each area. In Philadelphia about 37 percent of the population was black in 1960; in the 6 years over which the data were tallied, this proportion probably increased. In Westchester in 1970, the black population was only about 10 percent. Thus, one explanation of the difference in the racial composition of robbery incidents between Westchester County and Philadelphia may be that in Westchester there were proportionately more whites to serve as targets, while in Philadelphia, the proportion of blacks as possible targets was higher.

However, the proportionate difference in racial composition of the population does not suffice as the sole explanation. First, the population differences are not great enough to account for the large disparity in frequency of white victims solely on the basis of probability of victimization. Secondly, the differences in population structure apparently did not produce any substantial difference between the two places in race of offenders. The difference between the black population in Westchester County and Philadelphia is probably about 17 to 20 percentage points, yet the difference in percent black offenders is only about 4 percentage points (86 percent in Philadelphia, about 82 percent in Westchester County). In other words, the question becomes why are whites so much more frequently victimized in Westchester County than in Philadelphia when the offenders in each locale are predominantly black?

A second hypothesis may help answer that question. It may well be that the larger (in percentage terms) any population group is, the more variance it exhibits vis-a-vis socioeconomic characteristics such as income and occupation. The same may be true for those particular groups of victims or offenders, but in the data under consideration, no such specific information about victim or offender social characteristics was available. Thus, the larger percentage of black population in Philadelphia may represent a black community that is more occupationally diverse and more

TABLE 4	Racial composition of robberies in Philadelphia and Westchester County	

[In percent]

Offender/ victim race dyad	Philadelphia[a] (N=1,722)	Westchester County[b] (N=265)
Black offender, black victim	63	14
Black offender, white victim	23	69
White offender, black victim	1	3
White offender, white victim	13	15
Total[c]	100	100

[a] Source: Normandeau, 1968, p. 168. These percents are derived from data for a 7-year period, 1960-66.

[b] Source: Dunn, 1974, p. 376. The race category "black" includes all persons other than white.

[c] Percentages may not sum to 100 percent because of rounding.

socioeconomically affluent. Philadelphia, in comparison to Westchester County, probably has a much more viable black/other middle class. Even in large cities, the black/other middle class may be segregated from whites in respect to both commercial and social functions. Therefore, black robbers do not necessarily have to rob white victims in either personal theft or commercial situations. On the other hand, in a county such as Westchester—where commercial activity and money available for social purposes is much more highly concentrated in the white sector and where the black/other population is decidedly the minority and is constantly exposed to the dominant white affluence—the black/other robber is likely to see the white victim as a more remunerative target, even though not all white victims may be affluent.

Regardless of which is the more accurate or appropriate explanation, the instructive point (vis-a-vis

the next section) is that both "explanations" make use of apparent social differences between Philadelphia and Westchester County. As indicated earlier, and as described below, Westchester County exhibits a great deal of variation in social attributes. Thus, if the logic behind the explanation of differences between Philadelphia and Westchester County is accurate—that is, if characteristics of robbery can be "explained" in terms of differences among attributes of the respective counties of occurrence—the same logic applies to differences *within* Westchester County itself. In other words, it may well be that the distribution of robbery characteristics is not uniform within Westchester County, and can be better understood by studying such patterns in association with attribute differences among the different social areas in which robbery occurs.

Social Areas and Robbery Occurrence

In order to examine the distribution of robbery characteristics within Westchester County, it was necessary to divide the county into a small group of areas, each of which differed in a known way from the others on a number of attributes. This was accomplished by classifying the 205 census tracts in the county into homogeneous social area types. Once the 205 census tracts were grouped into a smaller set of nine social areas, each robbery incident could be assigned to a social area type. This was possible since the census tract in which each robbery occurred was known and recorded on the incident data record. All but a few census tracts were classifiable into these nine groups.

The social area types were objectively defined through the use of cluster analysis methods.[8] Nine different types of social areas were identified in Westchester County. These area types consisted of mutually exclusive groups of census tracts that differed on four general *sets* (clusters) of attributes (defined using 30 specific variables):

1) Housing structure/Household size,
2) Social problems,
3) Male household head/Males over 14, and
4) Socioeconomic status

The appendix presents a more complete discussion of the methods involved in creating this typology of areas.

[8] Ibid., pp. 128-188.

A description of each of the four sets of attributes begins on page 38.

The types of social areas identified ranged from tracts that were very low socioeconomic status/high social problem areas, to those that were quite the opposite (high status/low social problem tracts). One of the most salient features of the low status/high social problem tracts as a group was the large average proportion of black/other residents. In other words, for Westchester County a high-proportion black/other population was associated with low socioeconomic status and moderate to high levels of specific social problems (such as absence of fathers, unemployment, school dropouts). Other area types were moderate in socioeconomic status and social problems, but varied in respect to such things as family size, household size, proportions of males in relation to adult females, and proportions of female heads of households. The tracts that composed each of the social area types were found not to be randomly distributed throughout the county. Tracts of various types formed small geographic clusters, thereby lending credibility to the interpretation of tract types as social areas.

Table A-2 in the appendix presents a summary of the characteristics of the nine specific social area types. Although that table indicates nine specific patterns of social area attributes, it was found upon further analysis that there were only three basic groupings of social areas when both social structural characteristics and *rates of robbery* were taken into account. Table A-2 indicates that social areas HIPROB(7) and MEDPROB(8) had relatively high rates of robbery; that social areas CENTRAL(1), ETHMIX(3), WORKSUB(4), and SINGLEMAN(12) had moderate rates of robbery; and that MEDSUBURB(5), HIWEALTH(9), and COUNTRY (10) had low rates of robbery. In the analysis that follows, these three combined sets of social areas are used to examine differences in the distribution of robbery characteristics.[9]

[9] As reported in the appendix, the reasons for collapsing the nine specific social area types into three larger groupings involve the rates of robbery and the number of cases in the incident sample. In looking at the distribution of incident characteristics among social areas, it was logical to examine areas that were not only similar in social attributes, but also similar in rates of robbery. Furthermore, collapsing the nine specific area types prevented case attenuation that would have occurred in cross-tabulations due to the small number of sample incidents in some specific area types.

Robbery Characteristics and Social Areas of Occurrence

Racial Composition

In Dunn (1976), one of the most notable aspects of the distribution of assaults involved the racial composition of assault incidents in relation to areas of assault occurrence. About 72 percent of the assaults were intra-racial, while about 28 percent were interracial. These proportions did not differ much among high, medium, or low assault rate areas. Yet the race of the offender and the victim in all assaults as well as only in interracial assaults varied considerably from one area to the next.

The racial composition of robberies exhibits some interesting differences from that of assaults.[10] First, about 71 percent of all robberies in the county were interracial events, involving offenders and victims of different races compared with only 28 percent of the assault incidents. The largest proportion (68.7 percent of all robberies) were black/other offender, white victim robberies; interracial robberies involving white offenders and black/other victims were only 2.6 percent of all robberies. Intra-racial robberies (robberies in which the offender and the victim were of the same race) were about equally divided between white offender, white victim events (15.1 percent of all robberies) and black/other offender, black/other victim events (13.6 percent of all robberies). Table 5 shows, however, that some of these proportions differ, according to the area in which the robberies occurred. For example, no black/other offender, black/other victim robberies occurred in the upper-middle-class areas having low problem rates and low robbery rates. Also, the area group comprised of CENTRAL(1), ETHMIX(3), WORKSUB(4), and SINGLEMAN(12) had a proportion of white offender, white victim robberies (29.4 percent) about twice as great as the overall county percent (15.1 percent).

The pattern of interracial robberies differs slightly from that of interracial assaults. Even though there are only a few white offender, black/other victim robberies

[10] Dunn, 1976, pp. 16-21.

TABLE 5 Race of offender and victim by social area of robbery, Westchester County, 1970

[In percent]

Offender/victim race dyad	SOCIAL AREA OF ROBBERY			
	Low rate (5, 9, 10)[a]	Moderate rate (1, 3, 4, 12)[a]	High rate (7, 8)[a]	Percent of total (N=265)[b]
Black/other offender, black/other victim	0.0	4.7	18.9	13.6
Black/other offender, white victim	54.5	64.7	71.6	68.7
White offender, black/other victim	9.1	1.2	3.0	2.6
White offender, white victim	36.4	29.4	6.5	15.1
Percent of total (N=265)[b]	4.2	32.1	63.8	100.0

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of robbery rate/social attribute similarity. See pp. 16-17, supra, and the appendix, p. 42, infra.

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

TABLE 6 Age of offender and victim by social area of robbery, Westchester County, 1970

[In percent]

Offender/victim age dyad	SOCIAL AREA OF ROBBERY			
	Low rate (5, 9, 10)[a]	Moderate rate (1, 3, 4, 12)[a]	High rate (7, 8)[a]	Percent of total (N=160)[b]
Juvenile offender/ juvenile victim	40.0	19.3	28.6	25.6
Juvenile offender/ adult victim	0.0	21 1	26.5	23.7
Adult offender/ juvenile victim	0.0	5.3	5.1	5.0
Adult offender/ adult victim	60.0	54.4	39.8	45.6
Percent of total (N=160)[b]	3.1	35.6	61.2	100.0

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of robbery rate/social attribute similarity. See pp. 16-17, supra, and the appendix, p. 42, infra.

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

(seven), most of these (five) occurred in the social areas with high proportions of black/other population, in contrast to similar white offender, black/other victim assaults (not shown in tabular form). Because interracial robberies involving black/other offenders and white victims constitute such a large proportion of all robberies, their distribution among areas is not too different from the overall distribution. Nevertheless, a slightly higher proportion occurred in the high robbery rate, high proportion black/other areas than expected by chance alone. This finding about interracial robbery parallels the distribution of similar black/other offender, white victim assaults.

Age

The age of robbers and of robbery victims is somewhat differentially distributed among various social areas.[11] Juvenile offender/juvenile victim robberies

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[11] Similar findings are noted about the ages of assault offenders and victims. Dunn, 1976, pp. 22-23.

and juvenile offender/adult victim robberies occurred slightly more frequently in high robbery rate areas than expected on the basis of the marginal distributions in Table 6. Conversely, adult offender/adult victim robberies (which constitute the largest proportion of robberies, 45.6 percent) occurred more frequently than expected in the moderate and low robbery rate social areas. These robberies were 54.4 and 60 percent of all robberies in the moderate and low robbery rate social area groups, respectively.

Number of Offenders

Slightly less than three-quarters (72.2 percent) of all assaults in Westchester County involved only one offender, but the opposite was true for robberies. Two persons or more were involved in robberies about 60 percent of the time. Table 7 shows that these percentages vary among the three social area groups. For example, robberies by one person were more frequent in moderate robbery rate areas than in low or high robbery rate areas; 46.8 percent of the robberies in moderate robbery rate areas were committed by one person,

but only 33.3 percent of the robberies in low rate areas and 37.9 percent of the robberies in high rate areas were committed by a lone offender. Robbery by three or more persons was more frequent in high rate areas (27.5 percent) than in moderate rate areas (13.5 percent). Thus, there is a slight overall positive relationship between number of offenders involved in robbery incidents and the extent of the robbery problem in social areas.

However, when more specific information about the type of robbery is introduced, the relationship is modified. Probably the best single indicator of type of robbery is the location or site at which the incident occurred. The reason is that this one variable allows for a considerable scope of inference about other aspects of the robbery. The location of the incident describes to some extent the nature of the target (person, commercial establishment, type of business); such information may also indicate the general amount of money or property sought by the robber. From these inferred characteristics one may subsequently, on the basis of corres-

ponding information in the McClintock/Gibson and Conklin robbery types, make certain suppositions about the planning and structure of the robbery event.

The overall statistical relationship between number of offenders involved in robbery incidents and area of robbery occurrence is given by the gamma value of 0.15 for Table 7, a relatively weak association. However, this weak association is actually masking the effects of a third variable. The same relationship was analyzed for each general site of robbery occurrence—indoor private, indoor commercial, and outdoor. The gamma values of these site-specific relationships (see Table 8) reflect that for each location, there is a somewhat different relationship between number of offenders and social area of robbery occurrence. For robberies at private premises, there is a negative relationship between number of offenders and the three basic groups of social areas, i.e., robberies involving lone robbers are more frequently found in areas with high robbery rates. Although the frequency of such robberies in the low rate robbery areas is almost nil, the basic relationship is

TABLE 7 Number of offenders involved by social area of robbery, Westchester County, 1970

[In percent]

Number of offenders	SOCIAL AREA OF ROBBERY			Percent of total (N = 376)[b]
	Low rate (5, 9, 10)[a]	Moderate rate (1, 3, 4, 12)[a]	High rate (7, 8)[a]	
One	33.3	46.8	37.9	41.0
Two	41.7	39.7	34.6	37.0
More than two	25.0	13.5	27.5	22.1
Percent of total (N = 376)[b]	6.4	37.5	56.1	100.0

Gamma = 0.15

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of robbery rate/social attribute similarity. See pp. 16-17, supra, and the appendix, p. 42, infra.

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

given by the fact that 87.5 percent of the robberies of private premises in moderate robbery rate/middle-class residential social areas involved more than one offender, whereas the comparable percentage for the same robberies in high robbery rate/high social problem areas is 61.9 percent. On the other hand, the relationship is positive when commercial robberies and outdoor robberies are separately considered. The data show that there is a slight tendency for robberies of commercial sites and for outdoor robberies to involve more than two offenders if they are committed in high robbery rate/high social problem areas; in addition, commercial robberies in moderate robbery rate/middle-class residential areas involve *two offenders* more frequently than such robberies in high robbery rate/high social problem areas.

Means of Force

Another important single indicator of robbery activity is the means of force threatened or used in the incident. The probable seriousness of the means of threat

TABLE 8 Relationship between number of offenders and social area of robbery, by location, Westchester County, 1970

	All locations	Private residential locations only	Indoor commercial locations only	Outdoor locations
Gamma	0.15	-0.23 (N=31)	0.14 (N=83)	0.19 (N=243)

or use of force is slightly inversely related to the three basic groups of social areas of robbery occurrence, ordered in terms of robbery rates, i.e., more serious means were slightly more frequently used in low rate areas. Seriousness of means of force was somewhat arbitrarily ordered in the following way (from least severe to most severe): none, verbal threat, snatching, hands/feet,

knives, guns, multiple. Table 9 shows the overall relationship between the means of force and extent of the robbery problem in social areas. The gamma value of -0.13 for Table 9 indicates that there is only a slight tendency to resort to more serious means of force such as guns and multiple means in moderate and low robbery rate areas, respectively, but less serious means such as bodily attack are more frequent in high rate areas. One exception to this relationship is the use of verbal threats in robberies; verbal threats were involved in about 18 percent of the robberies in low rate areas, but in only about 5 percent of the robberies in the other social areas.

There are some interesting positive associations of specific means of force with specific social areas. For example, the use of guns in robberies is associated with WORKSUB(4); guns were involved in about 23 percent of all robberies in the county, but in WORKSUB(4) they were involved in 34 percent of all robberies. (Tables showing these percentages are not presented here.) The use of bodily force (hands/feet) is associated with three specific social areas, CENTRAL(1), ETHMIX(3), and MEDPROB(8). The use of bodily force was involved in about 30 percent of the robberies in the county; in CENTRAL(1), ETHMIX(3), and MEDPROB(8) these percents were

TABLE 9 Seriousness of means or threat of force by social area of robbery, Westchester County, 1970

[In percent]

Means or threat of force[a]	SOCIAL AREA OF ROBBERY			Percent of total (N = 355)[c]
	Low rate (5, 9, 10)[b]	Moderate rate (1, 3, 4, 12)[b]	High rate (7, 8)[b]	
None	0.0	2.3	4.5	3.4
Verbal threat	18.2	4.5	5.0	5.6
Snatching	0.0	2.3	3.5	2.8
Hands/feet	9.1	27.8	32.5	29.3
Knife	22.7	18.0	20.0	19.4
Gun		27.1	18.0	22.5
Multiple	13.6	18.0	16.5	16.9
Percent of total (N = 355)[c]	6.2	37.5	56.3	100.0

Gamma = -.013

[a] Ordered by potential for serious injury (if weapon is actually used).

[b] Numbers in parentheses identify specific social area types that comprise the three basic areas of robbery rate/social attribute similarity. See pp. 16-17, supra, and the appendix, p. 42, infra.

[c] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

respectively 42.9 percent, 53.8 percent, and 36.8 percent. The use of knives in robberies was associated with HIPROB(7), where 27.7 percent of the robberies involved the use of knives, compared with only about 20 percent of all robberies in the county. Multiple means were associated with MEDPROB(8), where about 25 percent of the robberies involved multiple means, compared with only 16.9 percent of the robberies throughout the county.

Location of Occurrence

Location of robberies was used earlier as a control variable in assessing the consistency of the relationship between number of offenders and area of robbery occurrence. In terms of its direct relationship to the extent of the robbery problem in social areas, there does not appear to be much association among general categories of location (indoor private, indoor commercial, and outdoor) and different robbery rate areas. About two-thirds of the robberies in the county occurred outdoors, about 23 percent were indoor commercial robberies, and only about 9 percent were robberies of private residential premises (see Table 10). These percentages do not vary much among the other three general area groupings.

However, if specific sites of robberies and specific social areas are examined, a few locations are associated with particular social areas (tables showing these percentages are not presented). Robberies at apartments are slightly less than 8 percent across the county, but in HIPROB(7), are 12.5 percent. Robberies of stores are about 13 percent of all robberies in the county, but in MEDPROB(8), are slightly over 18 percent. Robberies of gas stations are concentrated in

TABLE 10 Location by social area of robbery,
Westchester County, 1970

[In percent]

Location	SOCIAL AREA OF ROBBERY			
	Low rate (5, 9, 10)[a]	Moderate rate (1, 3, 4, 12)[a]	High rate (7, 8)[a]	Percent of total (N=377)[b]
Private residential	8.7	6.0	11.2	9.0
Indoor commercial	26.1	23.5	22.4	23.1
Outdoors	65.2	70.5	66.3	67.9
Percent of total (N=377)[b]	6.1	39.5	54.4	100.0

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of robbery rate/social attribute similarity. See pp. 16-17, supra, and the appendix, p. 42, infra.

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

WORKSUB(4), where they are about 19.5 percent of the robberies, compared with only 6 percent in the county at large. Street robberies are more frequent than expected in HIPROB(7) and ETHMIX(3), where they account for 57.3 and 62.5 percent of all robberies, respectively, compared with about 50 percent countywide.

Firearms and Commercial Robberies

The preceding sections about means of force and sites of robberies suggest that robberies involving weapons and robberies of commercial sites are concentrated in a particular social area type. Are these two different robbery attributes in fact related? Are firearms associated with robberies of commercial sites? A variable cluster analysis of robbery characteristics initially showed that firearms are associated with commercial robberies, particularly robberies of stores.[12] This association is directly indicated in the following tables. Table 11 presents the relationship between seriousness of means of force and general location of robbery for the entire county. The gamma value for Table 11 of -0.24 indicates a moderate inverse relationship between seriousness of means of force and degree of likely public access to the target;[13] the percentages, however, indicate the predominant influence of commercial robberies committed at gunpoint: whereas firearms were involved in 22.8 percent of all robberies, they were present at 51.8 percent of the indoor commercial robberies, compared with about 13 percent of the residential and outdoor robberies.

Tables 12, 13, and 14 present the relationship between seriousness of means of force and degree of likely public access to target, for each of the three general groups of social areas. A number of interesting aspects of the differential distribution of robberies are contained in the tables. First, the relationship between in-

door commercial targets and involvement of firearms is consistent across the three general areas of robbery occurrence. In low robbery rate areas, firearms are generally involved in 35 percent of the robberies, but in indoor commercial robberies, the use of firearms is indicated in about 83 percent of these robberies. In moderate robbery rate areas, firearms were present in about 27 percent of all robberies, but robberies of commercial sites involved the use of firearms in about 59 percent of the incidents. In high rate areas, robberies involving the presence of firearms were only about 19 percent of the incidents, but for commercial sites only, this was 43.2 percent.

Another interesting aspect of the tables is that the strength of the general relationship between seriousness of means of force and degree of likely public access to target differs among areas, although the direction is consistent. The respective gamma values of -0.50 for moderate robbery rate areas (Table 13) and -0.14 for high robbery rate areas (Table 14) indicate that the use of more serious means of force in conjunction with lesser degrees of likely public access occurs consistently only in moderate robbery rate social areas, CENTRAL(1), ETHMIX(3), WORKSUB(4), and SINGLEMAN(12).[14] This large inverse effect is due mainly to the concentration of "multiple" means of private residence robberies, the concentration of firearms at commercial robberies, and the concentration of knives and bodily force in street robberies.

Although there is a consistent negative relationship between seriousness of means of force and degree of likely public access to target, the data presented above point out that guns are involved in commercial robberies much more frequently in low and medium robbery rate areas than in high robbery rate areas. The low and medium robbery rate areas generally have more favorable social, economic, and residential conditions than high robbery rate areas. Commercial enterprises may reflect these more favorable circumstances in certain ways, e.g., by having larger amounts of cash on hand and a clientele that caries larger amounts of cash than those patronizing commercial establishments in high robbery rate areas. Consequently, robbers might per-

[12]Dunn, 1974, pp. 335-390.

[13]"Degree of likely public access" was a criterion used for ordering location of occurrence. It refers to a basic notion of how many people could rightfully and reasonably have access to each type of location. Private residences are lowest in this ordinal scheme. Commercial establishments, which have established times for operation and some reasonable expectation of purpose for persons who enter them, are next. Outdoors, consisting mainly of "street" and "park" subcategories, are reasonably open to the general public, and therefore are highest in this ranking scheme.

[14]For Table 11, gamma is not a good measure of association to utilize. The number of cases, coupled with the non-uniform marginal distribution of the independent variable (which reduces the number of non-tied pairs used to compute gamma), is too small to yield a coefficient in which we can have much confidence for comparative purposes.

TABLE 11 Seriousness of means or threat of force by location of robbery, Westchester County, 1970

[In percent]

Means or threat of force[a]	LOCATION OF ROBBERY			
	Private residential	Indoor commercial	Outdoors	Percent of total (N=347)[b]
None	0.0	1.2	4.3	3.2
Verbal threat	6.9	5.9	5.2	5.5
Snatching	6.9	0.0	3.4	2.9
Hands/feet	34.5	16.5	33.9	29.7
Knife	17.2	7.1	23.6	19.0
Gun	13.8	51.8	13.3	22.8
Multiple	20.7	17.6	16.3	17.0
Percent of total (N=347)[b]	8.4	24.5	67.1	100.0

Gamma = -0.24

[a] Ordered by potential for serious injury (if weapon is actually used).

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

TABLE 12 Seriousness of means or threat of force by location of robbery, for low robbery rate social areas, Westchester County, 1970

[In percent]

Means or threat of force[a]	LOCATION OF ROBBERY			
	Private residential	Indoor commercial	Outdoors	Percent of total (N=20)[b]
None	0.0	0.0	0.0	0.0
Verbal threat	50.0	16.7	16.7	20.0
Hands/feet	0.0	0.0	16.7	10.0
Knife	0.0	0.0	41.7	25.0
Gun	50.0	83.3	8.3	35.0
Multiple	0.0	0.0	16.7	10.0
Percent of total (N=20)[b]	10.0	30.0	60.0	100.0

Gamma = (c)

[a] Ordered by potential for serious injury (if weapon is actually used).

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

[c] A statistical measure of association would be inappropriate because of the small number of cases.

ceive that more serious threats of force are necessary to accomplish their purposes in such situations.

Multivariate Patterns

As is apparent from the findings presented above, some relationships between robbery characteristics and social areas are not simple bivariate relationships. Means of force and site of robbery are jointly interrelated with social area of occurrence. In particular, firearms are associated with robberies of commercial sites, especially stores, and this association is most acute in social areas CENTRAL(1), ETHMIX(3), and WORKSUB(4). These social areas have moderate *rates* of robbery, but are areas in which certain kinds of commercial establishments are more likely to be located.

Further analysis indicates that variations in the pattern described above occur even within that general group of social areas. For example, CENTRAL(1) had concentrations of three different robbery patterns, only one of which involved commercial sites, although CENTRAL(1) had characteristics of a central business area. (The other two patterns were street robbery patterns, one of which involved lone male offenders robbing lone male victims at night, and the other involving juvenile offenders robbing female victims during the day.) On the other hand, WORKSUB(4), a working-class or lower-middle-class residential area, had concentrations of two robbery patterns involving commercial sites, the difference in the two patterns being the race of the victim: one pattern involved white victims, the other, black/other victims. However, it is likely that these commercial sites were service stations as opposed to stores or other enterprises. Closer examination of specific commercial sites of robbery in WORKSUB(4) explains this apparent inconsistency between social area characteristics and robbery characteristics.[15] Robberies of stores accounted for about 13 percent of all robberies in the whole county, but only 6 percent in WORKSUB(4). In contrast, robberies of gas stations were only about 6 percent of all robberies in the whole county, but were about 20 percent in WORKSUB(4). Given the characteristics of WORKSUB(4), it is likely that gas stations are more prevalent in the area type than in other more well-to-do locations, or in areas such as CENTRAL(1), which have more concentrated patterns of commercial development such as shopping centers or business districts. In fact, the basic suburban nature of the county makes it likely that gas stations are located relatively close to or on the fringe of concentrations of persons or families with automobiles, another characteristic of WORKSUB(4).

Another multivariate pattern of robbery characteristics is consistent with Conklin's research on robbery. Intra-racial robberies involving black/other offenders and victims and robberies involving both juvenile offenders and juvenile victims were concentrated in HIPROB(7) and MEDPROB(8), the high social problem areas. These areas also have a high percentage black/other population and a low index of socioeconomic status. Such characteristics probably account to some extent for the pattern of robberies described above. Those patterns, as well as their social setting, are consistent with the characteristics of the opportunist robber described by Conklin. Such robbers

[15]Dunn, 1974, pp. 370-371.

TABLE 13 Seriousness of means or threat of force by location of robbery, for moderate robbery rate social areas, Westchester County, 1970

[In percent]

| Means or threat of force[a] | LOCATION OF ROBBERY | | | |
	Private residential	Indoor commercial	Outdoors	Percent of total (N=131)[b]
None	0.0	0.0	3.3	2.3
Verbal threat	0.0	3.1	4.3	3.8
Snatching	0.0	0.0	3.3	2.3
Hands/feet	42.9	9.4	33.7	28.2
Knife	0.0	3.1	25.0	18.3
Gun	14.3	59.4	16.3	26.7
Multiple	42.9	25.0	14.1	18.3
Percent of total (N=131)[b]	5.3	24.4	70.2	100.0

Gamma = -0.50

[a] Ordered by potential for serious injury (if weapon is actually used).

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

TABLE 14 Seriousness of means or threat of force by location of robbery, for high robbery rate social areas, Westchester County, 1970

[In percent]

| Means or threat of force[a] | LOCATION OF ROBBERY | | | |
	Private residential	Indoor commercial	Outdoors	Percent of total (N=191)[b]
None	0.0	2.3	5.5	4.2
Verbal threat	5.0	6.8	4.7	5.2
Snatching	10.0	0.0	3.1	3.1
Hands/feet	35.0	20.5	36.2	32.5
Knife	25.0	11.4	21.3	19.4
Gun	10.0	43.2	11.8	18.8
Multiple	15.0	15.9	17.3	16.8
Percent of total (N=191)[b]	10.5	23.0	66.5	100.0

Gamma = -0.14

[a] Ordered by potential for serious injury (if weapon is actually used).

[b] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

are usually young or other than white persons (or both), and usually steal small amounts. Other characteristics of robberies in HIPROB(7) and MEDPROB(8) lend credence to this interpretation. About 85 percent of all robberies specifically occurring at schools or recreation areas in the county, and about 60 percent of all street robberies, occurred in HIPROB(7) or MEDPROB(8). These site-specific concentrations, the prevalence of black/other offender, black/other victim robberies, and the juvenile offender/juvenile victim robbery pattern in these two social areas are evidence that a substantial proportion of robberies in HIPROB(7) and MEDPROB(8) conform to Conklin's opportunist pattern.

The Comparison of Robbery and Assault

The current research has indicated that robbery occurs in a variety of forms. Variation among salient characteristics, variation in area rates, and variation in characteristics among areas all have been documented. Although the present effort intends little more than to identify and document the statistical patterns of variation, it is possible to compare findings for assault and

robbery.[16] Because the same set of information about offense characteristics was available for assault and robbery and the same area typology was used, direct comparisons between the distribution of assault and robbery characteristics among the social areas can be drawn to answer the questions, are the patterns of offense characteristics and social areas in which they occur the same for assault as for robbery? Or do robbery and assault exhibit distinct and unique patterns of characteristics and location?

In the separate analyses of the assault and robbery characteristics among social areas, the nine specific

[16] Findings specifically for assault characteristics are found in a companion report to this volume. See Dunn, 1976.

social area types were collapsed into three groups. Unfortunately, these mergers differed for each offense. Therefore, it was necessary to devise a new grouping of the nine specific social areas, one which would be compatible for analyzing both assault and robbery simultaneously.

HISES/LOPROB (high socioeconomic status/low social problems) is composed of those social area types (MEDSUBURB, HIWEALTH, COUNTRY, and SINGLEMAN) that were basically upper- and upper-middle-class residential areas. It also includes those parts of the county that are relatively more rural, in effect having larger lot sizes and lower population densities. Rates of assault and robber in these social areas are quite low in comparison to rates in other social area

types, a typical finding in most traditional crime area studies.

MEDSES/MEDPROB (moderate socioeconomic status/moderate social problems) describes that group of three specific social areas (CENTRAL, ETHMIX, and WORKSUB) that are moderate socioeconomic status areas and have moderate levels of specific social problems. ETHMIX and WORKSUB represent basically lower-middle and working-class residential areas. CENTRAL, the third area type included in this grouping, possesses characteristics that indicate that it is more central-city-like than any of the other specific area types—i.e., it has a low resident population density, a large percentage of dwelling units that are multiple family units, and moderate property and rental values.

The third group of social areas, LOSES/HIPROB (low socioeconomic status/ high social problems), is composed of the two specific area types (HIPROB and MEDPROB) that were the lowest in socioeconomic status and highest in levels of specific social problems such as unemployment, idle youth, nontraditional family structures, poverty, and lack of transportation. In Westchester County these areas also had, by far, the highest rates of assault and robbery, also typical of most crime area studies.

Variation in Offense Characteristics

Three offense characteristics were selected as an exemplary set for purposes of comparing assault with robbery. *Racial composition of the incident* consists of the four possible offender/victim racial pairs: (1) white offender, black/other victim; (2) white offender/white victim; (3) black/other offender, black/other victim; and (4) black/other offender, white victim. *Weapon or means of force* used in the incident has been ordered into four classes that reflect the likely seriousness of injury that could occur if the weapon were actually employed: (1) bodily force, (2) knife, (3) firearm, and (4) multiple (a combination of any two or more specific means listed in the original data set). *Nature of site of occurrence* represents the specific property use of the location at which the offense occurred. Again, a large number of possible specific sites were grouped and ordered into four classes: (1) residential, (2) commercial, (3) entertainment, (4) public. The order is based on the likely degree of public access to the various sites.

Tables 15, 16, and 17 (columns 2 and 3) indicate the variation in these characteristics between assault and robbery across the whole county. Table 15 shows that offender/victim race composition differs markedly between assault and robbery. The most prevalent category for assault is black/other offender, black/other victim, but for robbery it is black/other offender, white victim. Two other categories of racial composition of assault are also present in relatively substantial percentages; white offender, white victim assault and black/other offender, white victim assault, both around 25 percent.

Table 16 indicates that two categories of weapon usage or means of force occur in similar proportions for assault and robbery. Bodily force is involved in slightly under or slightly over 40 percent of assault and robbery, respectively. "Multiple" (indicating that a combination of weapons or means of force were involved) also has a similar proportionate frequency for assault and for robbery, about 18 and 17 percent, respectively.

On the other hand, there are moderate differences between assault and robbery in respect to the presence of knives versus firearms across the whole county. Knives are more frequently used in assault than in robbery (about 34 percent versus 19 percent), while firearms are more frequently involved in robbery than in assault (about 23 percent versus 9 percent).

Table 17 shows that public occurrences of assault and robbery are by far the most frequent, more so for robbery than for assault. The greatest individual component of the public category is "on street," for both assault and robbery. There is only a slight difference between the offenses in respect to occurrence at entertainment sites. To a large degree, this category represents offenses at restaurants and bars, which it might be suspected would involve assault to a larger degree than robbery. However, the remaining two categories, "residential" and "commercial," exhibit substantial proportionate differences between assault and robbery. Assault in residences is proportionately more frequent than robbery in residences; as also might be expected, robbery at commercial sites is more frequent than similarly situated assault.

Offense Characteristic Variation Among Social Areas

At this point in the analysis, social area of occurrence was introduced as a control variable. That is to say, the proportionate frequency of each offense

characteristic—racial composition, means of force, and site—was identified for assaults and for robberies, for each of the three new (pp. 27-28) groupings of social areas previously identified, instead of for the county as a whole. These data are shown in columns four through nine of Tables 15, 16, and 17.

Some interesting configurations and effects are noted. One way of analyzing the effect of social area on each of the separate incident characteristic/offense relationships presented earlier is by means of association coefficients. Kendall's tau, a rank order association statistic, was computed for each of the three tables shown above. The tau values for the county as a whole

are shown in the first column of Table 18. Appropriate computations were also made for Kendall's tau between offense (assault versus robbery) and each of the three incident characteristic variables *for each social area*; these values are also shown in Table 18 columns two through four. The area-specific tau values for two variables (racial composition and site of occurrence) indicate little or no difference from the zero-order coefficients, meaning that the racial composition of the event and the type of location in which it occurred are related to offense type in about the same way across area. However, the area-specific tau values for weapon usage do indicate a substantial difference among areas

TABLE 15 Race of offender and victim by social area and type of offense, Westchester County, 1970

[In percent]

| | ENTIRE COUNTY | | | SOCIAL AREA TYPE | | | | | |
| | | | | High socioeconomic status, low social problems (HISES/LOPROB) | | Moderate socioeconomic status, moderate social problems (MEDSES/MEDPROB) | | Low socioeconomic status, high social problems (LOSES/HIPROB) | |
Offender/victim race dyad	Total	Assault	Rob-bery	Assault	Rob-bery	Assault	Rob-bery	Assault	Rob-bery
White offender, black/other victim	2.5	2.4	2.6	21.4	6.3	2.0	1.3	0.0	3.0
White offender, white victim	19.2	25.6	15.3	57.1	31.3	52.0	30.0	7.1	6.5
Black/other offender, black/other victim	26.2	47.0	13.4	7.1	6.3	24.0	3.8	64.3	18.9
Black/other offender, white victim	52.1	25.0	68.7	14.3	56.3	22.0	65.0	28.6	71.6
Total[a]	100.0 (N=432)	100.0 (N=164)	100.0 (N=268)	100.0 (N=14)	100.0 (N=16)	100.0 (N=50)	100.0 (N=80)	100.0 (N=98)	100.0 (N=169)

[a] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

TABLE 16   Means of force by social area and type of offense,
Westchester County, 1970

[In percent]

| | ENTIRE COUNTY | | | SOCIAL AREA TYPE | | | | | |
| | | | | High socioeconomic status, low social problems (HISES/LOPROB) | | Moderate socioeconomic status, moderate social problems (MEDSES/MEDPROB) | | Low socioeconomic status, high social problems (LOSES/HIPROB) | |
Means of force	Total	Assault	Rob-bery	Assault	Rob-bery	Assault	Rob-bery	Assault	Rob-bery
Hands/feet	40.1	38.4	41.3	57.9	29.0	48.4	37.1	26.3	45.5
Knife	25.6	34.3	19.1	21.1	19.4	22.6	18.5	45.9	20.0
Firearm	16.9	9.0	22.7	5.3	38.7	11.8	25.8	8.3	18.0
Multiple	17.5	18.3	16.9	15.8	12.9	17.2	18.5	19.5	16.5
Total[a]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(N=629)	(N=268)	(N=361)	(N=38)	(N=31)	(N=93)	(N=124)	(N=133)	(N=200)

[a] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

TABLE 17   Location by social area and type of offense,
Westchester County, 1970

[In percent]

| | ENTIRE COUNTY | | | SOCIAL AREA TYPE | | | | | |
| | | | | High socioeconomic status, low social problems (HISES/LOPROB) | | Moderate socioeconomic status, moderate social problems (MEDSES/MEDPROB) | | Low socioeconomic status, high social problems (LOSES/HIPROB) | |
Location	Total	Assault	Rob-bery	Assault	Rob-bery	Assault	Rob-bery	Assault	Rob-bery
Residential	16.0	26.0	9.1	29.0	6.5	28.9	7.1	24.0	11.2
Commercial	15.5	6.5	21.7	0.0	19.4	9.3	27.9	6.2	17.1
Entertainment	9.0	13.4	6.0	22.6	16.1	12.4	7.1	12.4	3.9
Public	59.5	54.2	63.2	48.4	58.1	49.5	57.9	57.4	67.8
Total[a]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(N=645)	(N=262)	(N=383)	(N=31)	(N=31)	(N=97)	(N=140)	(N=129)	(N=205)

[a] The total number of cases shown for each table may vary because of missing values. Percentages may not sum to 100 percent because of rounding.

with respect to the relationship between type of offense and weapon, an effect that is masked by a countywide analysis.

Tables 15, 16, and 17 show these effects in further detail. Table 15 presents racial composition by offense and social area of occurrence. The table indicates a number of interesting effects. White offender, black/other victim assault, white offender, white victim assault, and white offender/white victim robbery decrease in proportionate frequency as the attributes of areas of occurrence become less desirable (i.e., social problems increase, socioeconomic status

decreases). Conversely, black/other offender, white victim assault and robbery, as well as black/other offender, black/other victim assault increase in proportionate frequency across the three general groups of social areas as social problems increase. The table thus shows that the effect of social area on racial composition of incidents is greater for assault than for robbery offenses, a finding that is also indicated by the computation of separate tau values showing the relationship between racial composition and area of occurrence for assault (tau = .35) and robbery (tau = .10; neither shown in tabular form).

Table 16 presents a proportionate distribution of various weapons or means of force employed in assault and robbery for each of the three social area groups. This table indicates a different pattern of relationships than did the previous table for racial composition. The previous table indicated that, in effect, the same differences between assault and robbery in racial composition were maintained across the social area groups, and statistically speaking, the relationship between racial composition and area was stronger for assault than for robbery.

For weapons or means of force, another pattern occurs. For example, the overall countywide distribution of bodily force as a means of attack was about 38 percent of all assault and about 41 percent of all robbery. However, Table 16 shows that when the analysis is conducted for separate groups of social areas, there is a distinct difference between assault and robbery in the use of bodily force. In MEDSES/MEDPROB bodily force is resorted to more frequently in assault than in robbery (comparing column six with column seven). The converse is true in LOSES/HIPROB, the low

TABLE 18 Associations[a] between incident characteristics and offense type (assault versus robbery), by social area, Westchester County, 1970

[In percent]

Incident characteristic	ENTIRE COUNTY	SOCIAL AREA TYPE		
		High socioeconomic status, low social problems (HISES/LOPROB)	Moderate socioeconomic status, moderate social problems (MEDSES/MEDPROB)	Low socioeconomic status, high social problems (LOSES/HIPROB)
Racial Composition	0.36	0.47	0.35	0.35
Means of Force	0.03	0.30	0.13	-0.11
Location	0.11	0.14	0.14	0.11

[a] Coefficients appearing in the table are values of Kendall's tau C.

socioeconomic status, high social problem area type (comparing column eight with column nine).

The use of knives is another example of the point under discussion. Across the county as a whole (columns 2 and 3, Table 16), a more frequent resort to the use of knives (about 34 percent) in assault than in robbery (about 19 percent) is observed. However, this difference is not found throughout the county; it occurs only in LOSES/HIPROB, the low socioeconomic status, high social problem areas. There (columns eight and nine, Table 16), knives are used in assault more than twice as frequently (46 percent) as they are used in robbery (20 percent). In the other weapon categories, the *difference* between assault and robbery vis-a-vis use of firearms is maintained across the social area groups, as is the *similarity* between the two offenses in the "multiple" category of weapons or means of force.

Statistically, the differences identified above between the county as a whole and separate groups of social areas vis-a-vis force used are shown by the area-specific tau values in Table 18. Furthermore, when the tau between means of force and area is computed separately for assault and for robbery (neither shown in tabular form), there is a slight positive relationship between seriousness of means of force and social area conditions for assault (tau = .16), and a slight negative relationship between the two variables for robbery (tau = -.09). That is, as conditions of socioeconomic status become less favorable and as specific social problems increase, means of force in assault tends to increase slightly in seriousness, while means of force in robbery tends to decrease slightly in seriousness.

Nature of site of occurrence is another variable for which substantial differences were noted between assault and robbery across the whole county. For example, 26 percent of all assaults occurred at residences, compared with only about 9 percent of all robberies. The first row of Table 17 indicates that these

differences are maintained across the social area groups, and remain at about the same respective levels. The same pattern—proportionately more assault than robbery—also occurs in all three social area types for offenses occurring at entertainment sites (e.g., restaurants and bars).

Variation between frequency of assault and robbery at commercial places is opposite that for residences and entertainment sites. Proportionately more robbery occurred at commercial sites than assault in all three social area types. The same finding applied to proportionate occurrence of assault and robbery in public places (i.e., on streets).

When tau values between nature of site of occurrence and area are examined separately for assault (tau = .06) and robbery (tau = .05; neither shown in tabular form) no difference in magnitude or direction is indicated. Thus, the absence of an ordinal relationship between site of occurrence and offense type across the whole county is apparently independent of any off-setting or masking area effects that differ by area. However, the differences in percent between site and offense type, while consistent across social area type, do indicate important substantive differences in the immediate locations of assaults and robberies. Of even further interest is the observation that specific sites of robbery and area type of occurrence are not uniform within a particular social area group, in particular, MEDSES/MEDPROB (moderate socioeconomic status/moderate social problems). Earlier analysis showed that robberies of stores tended to occur in CENTRAL(1), the central-city-like social area, while robberies of gas stations—also in the commercial category—tended to occur in WORKSUB(4), a lower-middle or working-class suburban social area type.[17]

Summary of Findings

The data presented here indicate that *there are differences in the distribution of incident characteristics that are related to type of offense, type of social area, and offense and area type jointly.* Racial composition is associated (in Westchester County) both with offense and with social area, but patterns of racial differences between assault and robbery persist over

social areas. Weapon use or means of force is apparently related to a joint effect of offense type and area type, since the relationship between offense and means of force is masked by an overall county analysis and appears only when specific social areas are examined. Nature of site of occurrence differs somewhat (but not in an ordinal relationship) as a function of offense type; there is also not much difference among areas in those offense effects on site of occurrence. Furthermore, there are also indications that site of occurrence varies independently of area, at least with respect to the broad area groupings employed here. In earlier analysis it was shown, however, that particular sites of occurrence did vary in relation to certain area attributes. As was indicated above, store robberies occurred in a central-city-like area, while robberies of gas stations occurred in a residential area likely to have gas stations, a lower-middle or working-class suburban area type. Another illustration of this limited relationship is the association of assaults occurring in apartments with social areas having a large proportion of multiple-family dwelling units.

Conclusion

The findings discussed above present the distribution of crime on the basis of three kinds of information—incident characteristics, offense type, and social area attributes. The rich diversity of relationships among the sets suggests that all three dimensions are necessary to account efficiently for the distribution of offenses in relatively heterogeneous areas, even when these areas are perhaps served by only one police department.

Each set of information contributes in some degree to its own unique effects upon the distribution of crime, since there is no overall pattern of complete, 100 percent contingency or dependency among any of the variables. Nevertheless, there are interesting patterns of variation in both offense type and offense characteristics, some of which persist across social areas, and some of which are associated with differences among social areas.

At present, these patterns are only statistically assessed. However, the findings of this research suggest that a certain noncausal character or quality might apply to the interrelationships that were discovered in the

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[17]Dunn, 1974, pp. 335, 390.

data. In effect, this quality might be described as a set of environmental forces that increase the probability of occurrence of a particular type of characteristic of crime. Clearly, such relationships have been demonstrated. For example, it is highly likely that there are more black/other offender, black/other victim assaults in areas with higher proportions of black/other persons, because this higher proportion increases the frequency of general intra-racial social interactions out of which interpersonal conflict and assault may ensue. However, the predominant racial composition form of robbery in the same areas is interracial (black/other offenders robbing white victims), thereby suggesting that there is a distinct difference between assault and robbery in the circumstances out of which each offense arises.

It is altogether clear that for many of the relationships uncovered by this research, there is no simple or obvious explanation that accounts for differences between offenses in the area distribution of incident characteristics. That is to say, relationships between incident characteristics and social area attributes may reflect many processes—e.g., differences in opportunity, availability of targets or victims, accessibility, or attractiveness—that result ultimately in differences among areas with respect to nature of the offense. The form that such relationships

assume is not always obvious, nor can the mechanism or process of such effects be explained on the basis of the present set of information.

In conclusion, it must also be mentioned that a large amount of past crime area research has even failed to make distinctions as to the nature of forms of crime occurrence among areas that are presented in this paper. The methods presented throughout this and an earlier paper (Dunn: 1976) demonstrate relatively simple techniques by which social area differences in the nature of criminal activity can be assessed.

Consequently, it is no longer possible to ignore the demonstrated fact that the nature of crime does vary in some ways among areas, but is uniform across areas with respect to other characteristics. Thus, subsequent empirical research, which attempts to "explain" crime occurrence, must at the very least address this issue. Crime occurrence—even within specific law-defined categories—is heterogeneous, exhibiting variation across a number of different dimensions. Perhaps one value that emerges from the examination of those complex patterns is a skepticism for simplistic approaches to the reduction of harmful social behavior and for simplistic responses to its occurrence. While the price of complexity is often an increase in the problems (both moral and operational) of control, the price of simplicity may be the total absence of control.

APPENDIX: Social Areas in Westchester County

The definition of the nine social area types discussed in the text and summarized in Table A-2 below involved a two-stage analysis. Each of the area types is a unique group of census tracts that have similar characteristics on four general social attribute dimensions. Each type has a pattern of characteristics or scores across the 4 dimensions that is different from that of every other type. The 4 general dimensions of social attributes were created from 30 social indicator variables such as income, education, housing conditions, population distribution, and age structure.

The methods of data analysis that were employed in the construction of this typology were the techniques of "variable" and "object" cluster analysis as described by R.C. Tryon and D.E. Bailey in their book **Cluster Analysis** (1970). These techniques provide a powerful means of reducing a large number of variables to a smaller number of generalized dimensions (variable clustering or for short, V-analysis), and then using these dimensions to create a typology, that is, to classify objects into groups according to their pattern of scores on those dimensions (object clustering, or for short, O-analysis).

In the current work, the variables involved in the definition of the 4 general social attribute dimensions are 30 social indicator variables, and the objects being classified on those dimensions are the 205 census tracts in Westchester County to which the 30 variables pertain. This appendix summarizes the application of the procedures identified above to create the nine social area types used in the text and provides information relevant to understanding Table A-2. For an extended discussion of these methods and their application in the current example, the reader is referred to Dunn (1974) and to Tryon and Bailey (1970) for the development and description of the techniques of cluster analysis.

Social Variables Available for Analysis

It was decided to use approximately 30 social indicator variables as focal variables in summarizing the

dimensions of social area characteristics in Westchester County. These variables are presented in Table A-1 along with basic descriptive statistics summarizing their distribution among the 202 census tracts appropriate for the analysis.[1] These data reflect that although Westchester County may be one of the more affluent counties in the United States, it is also a county in which various individual social and economic indicators exhibit substantial variation. The techniques of cluster analysis were employed to summarize that variation among variables across census tracts.

Area Attribute Dimensions in Westchester County

The 30 social indicator variables described in Table A-1 were analyzed through the use of a set of cluster and factor analysis programs developed by Tryon and Bailey (1970) known as BCTRY.[2] The BCTRY cluster analysis package contains a number of varied programs designed to permit clustering of both variables and objects, beginning with raw scores. In preparation for clustering of social attribute variables, census tract data were entered and stored in the computer, and an intercorrelation matrix of the 30 variables was computed and maintained on storage tapes.

[1] In 1970, there were a total of 205 census tracts in Westchester County. However, three were deemed as inappropriate for inclusion in the analysis. These three were special use census tracts. One was the New York State Correctional Facility at Ossining (Sing-Sing Prison). Another was a Veteran's Administration Hospital, and the third was an uninhabited island.

[2] A growing number of computer programs are available for data analysis of many sorts. Generally speaking, these large program systems take their "names" from a variety of sources. At the time of the development of the cluster and factor analysis package used in this research, the early 1960's, Tryon and Bailey were working at the University of California, Berkeley. Bailey (1970:xiii) reports that it was necessary to attach a name to the program package. He suggested TRYON in honor of the extensive contributions made by Robert C. Tryon. However, this was modified to BCTRY, reflecting the Berkeley, California location of the research site.

TABLE A-1 Social Indicator Variables, Westchester County, 1970

Focal Variable	Median	Mean	Standard Deviation	Minimum Value	Maximum Value
1 Tract population	4216	4413.0	1542.3	599.	8337.
2 Percent of tract population which is male, 14 years and older	35.002	35.0	2.7	26.87	57.99
3 Percent of tract population which is single male, 14 years and older	9.372	9.4	2.0	4.619	27.365
4 Ratio of males, 14 and older to females, 14 and older	.866	0.8	0.1	.47	1.78
5 Percent of tract population five years and older residing in same house in 1970 as in 1965	60.677	59.8	8.7	31.491	76.772
6 Percent of total tract population which is Negro	2.050	10.5	18.7	0.00	91.4
7 Percent of tract population which is foreign born	11.051	12.1	4.9	3.385	30.583
8 Percent of total children in tract less than 18 years old who live in families with female head of household	5.950	8.3	6.5	0.00	33.400
9 Percent which female heads of household with children less than 18 years old are of total heads of household	3.652	4.8	3.5	0.00	22.048
10 Median school years completed by persons 25 years and older	12.437	12.5	1.4	8.900	16.200
11 Percent of tract population 16 to 21 years of age not high school graduate and not enrolled in school	6.000	8.0	7.1	0.00	34.30
12 Children ever born per 1,000 women 35 years to 44 years of age ever married	2619	2558.9	439.5	0.00	3908.00
13 Median 1969 income of all families	13505.500	15144.7	6379.2	7354.00	47416.00
14 Percent of all families with 1969 family income below poverty level	3.700	4.7	3.7	0.00	23.400
15 Percent of all families receiving public assistance or public welfare income	1.864	3.1	3.2	0.00	16.971

Table A-1 Continued

Focal Variable	Median	Mean	Standard Deviation	Minimum Value	Maximum Value
16 Income inequality measure "A": mean family income minus median family income	1614.500	2478.4	2391.8	-80.00	13003.00
17 Income inequality measure "C": ratio of percent of families with 1969 income greater than $15,000 to percent of families with 1969 income below poverty level	11.669	20.3	28.9	0.00	187.500
18 Percent of male civilian labor force which is unemployed	2.236	2.5	1.7	0.00	12.500
19 Percent of female civilian labor force which is unemployed	2.775	3.0	1.9	0.00	11.600
20 Persons per household	3.102	3.1	0.4	2.050	4.250
21 Median rooms of households	4.950	5.3	1.3	3.200	8.500
22 Median persons per housing unit	2.779	2.8	0.5	1.800	4.200
23 Percent of housing units without complete plumbing facilities	1.025	2.2	3.1	0.00	25.477
24 Percent of housing units with some form of air conditioning	43.344	44.9	17.0	7.459	88.968
25 Percent of housing units with no automobile available	11.591	16.4	14.0	0.00	64.757
26 Median value, owner occupied dwelling units	34,150.000	34986.1	10729.7	0.00	50000.00
27 Median contract rent, renter occupied dwelling units	138.500	141.8	42.9	63.00	300.00
28 Percent of dwelling units which are owner occupied	53.811	52.4	27.3	.931	97.516
29 Percent of dwelling units which are occupied	98.200	97.3	3.1	78.144	100.000

30 Percent of dwelling units which are single unit housing structures (percent single family houses)	42.525	47.5	33.1	0.00	100.000

Source: U.S. Bureau of the Census, *1970 Census of Population and Housing Census Tracts.* New York, New York, Standard Metropolitan Statistical Area, Westchester County Excerpt. Prepared by the Westchester County Department of Planning.

All factoring or clustering methods usually begin with a matrix of intercorrelations among the variables in question. The object of most factoring methods is to group variables empirically that have like patterns of intercorrelations. Some methods (centroid or principal axes) group the entire set of variables by attaching weights to the variables. Each factor represents a different weighting of the entire matrix after variation explained by a previous weighting or "factor" has been removed.

Cluster analysis, however, identifies subsets of variables according to three sets of criteria. First, the dimensions (groups of variables) identified by cluster analysis methods must be composed of "mutually collinear" variables. That is, all the variables in any one dimension (cluster) must be highly intercorrelated with each other. Second, each dimension must account for a sufficient proportion of the total variation in the total intercorrelation matrix. That is, each dimension must meet certain standards for generality construed in terms of a specified proportion of variation in the total matrix. Third, each dimension must be relatively independent of the others. That is, each dimension must represent a different portion of variation in the total matrix of intercorrelation than the other dimensions.

The cluster analysis of the 30 social indicator variables resulted in 4 groups of interrelated variables. After substantive interpretation of these clusters, it was concluded that variation across census tracts in social characteristics could be considered in terms of only four general dimensions of social attributes.

Dimension 1, **Household structure/ Household size**, was defined by intercorrelated variables that pertain to structure and size of households. Tracts with larger percentages of single-unit houses, that are owner-occupied also tend to be tracts in which family size is relatively larger. This is indicated by such variables in the cluster as persons per household, median number of rooms in household, and median persons per room of the household. Furthermore, these tracts also tend to have smaller percentages of persons who are foreign-born and greater numbers of children born per 1,000 women age 35 to 44 ever married. In other words, tracts with more single-unit, owner-occupied dwellings tend also to be tracts with larger families. Low values on this dimension generally indicate greater percentages of persons residing alone or with smaller families and smaller, apartment-type dwelling units in a census tract. Medium values indicate greater proportions of moderate size families and moderately sized and priced dwelling units in a census tract. High values of this dimension generally indicate greater proportions of large families and higher priced owner-occupied dwelling units in a census tract.

Dimension 2, **Social problems**, is defined by inter-correlated variables that represent families headed by females, family income deficiencies, and other specific social and housing disabilities, e.g., unemployment, school dropouts, lack of auto transport, and absence of certain basic sanitary or comfort facilities (plumbing and air conditioning, respectively). This same array of characteristics is also highly associated with percentage of black population. For Westchester County in 1970, this cluster suggests that nontraditional family structure, high concentrations of black population, and social problems are highly interrelated. Low values on this dimension indicate a relative absence of these specific kinds of social problems. Medium and high values on this dimension indicate, respectively, moderate and high levels of the specific kinds of social problems that define the dimension.

Dimension 3, **Male household head/Males over 14,** pertains to the sex composition of census tracts. It is defined mainly by intercorrelated variables indicating the percent of a census tract population that is adult male (over 14), single adult male, and male head of household. High values on this dimension characterize census tracts with relatively larger proportions of males over 14, of single males over 14, and of male heads of households. Low values on the dimension indicate the greater proportions of adult females and female heads of households. Medium values on this dimension indicate relatively equal percentages of adult males and adult females.

The fourth dimension, **Socioeconomic status,** is defined mainly by income, income disparity, education, and house value or rent amount. Such a configuration of variables has traditionally been conceptualized as socioeconomic status.[3] Although it is positively related to dimension 1 (Housing structure/Household size) and negatively related to dimension 2 (Social problems) the empirical findings indicate that it does not exactly duplicate the portions of variation encompassed by those other dimensions. This implies that there are probably census tracts in Westchester County that are medium socioeconomic status tracts according to traditional social class measures, but may also have substantial levels of social problems. On the other hand, tracts with relatively low or moderate amounts of specific social problems may be lower-class according to the traditional measures.

Furthermore, it makes conceptual sense to think of specific social problems as separate from overall social status. The characteristics encompassed by the social problem dimension seem to be much more representative of the *quality* of the specific conditions under which people live or of certain cultural patterns such as nontraditional family structure. Socioeconomic status, on the other hand, describes something more general about how prosperous people in certain areas are. Low values on this dimension indicate census tracts that are relatively low socioeconomic status tracts; correspon-

dingly, medium values on this dimension indicate tracts that are moderate/middle-class, and high values indicate tracts, that are upper-middle-class and upper-class places, respectively.

In summary so far, 30 focal social area characteristics have been examined across 202 census tracts in Westchester County. It was discovered through variable cluster analysis techniques that these 30 focal variables represent only 4 generalized social area attributed dimensions:

1) Housing structure/Household size
2) Social problems
3) Male household head/Males over 14, and
4) Socioeconomic status

Types of Social Areas in Westchester County

Each of the four dimensions identified through V-analysis was input to a BCTRY program that computed standardized composite dimension scores. For each case (in other words, for each of the 202 census tracts) four composite scores, one for each dimension, based on the defining variables of that dimension, were calculated.[4] In this way, each dimension could be treated as a variable in the subsequent typological analysis.

These cluster scores were then used in the BCTRY program to determine different types of census tracts based on similarities in patterns of cluster scores. Suppose that there are a number of census tracts that are characterized by two attributes, A and B. Suppose further, that A and B each have only two possible values: possessing A or not possessing A; and possessing B or not possessing B. Only four combinations of A and B are possible: (1) having both A and B; (2) having

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[3]See, for example, Lander, 1954; Bordua, 1958; or Chilton, 1964.

[4]Such scores are normally referred to as factor scores. There are a number of ways in which such scores can be computed. In the present research, the simple sum scoring method was used. Generally speaking, a cluster or dimension can be most easily conceptualized as the additive effects of a set of variables, that is $C = V_1 + V_2 + V_3$. Simple sum cluster scores are computed by standardizing the scores of each variable, summing them, and standardizing this sum in relation to other dimensions. The result is a score for each case on each cluster that can be treated exactly as if it were raw data.

A but not B; (3) not having A but having B; and (4) having neither A nor B. In other words, any particular census tract could be fit into one of the four possible combinations of A and B. The four possible combinations can be considered as types, since they reflect different patterns of the joint distribution of A and B.

The number of types (combinations of A and B) is a function of two values: (1) the number of dimensions (variables) and (2) the number of values each dimension can assume. Hence, the merit of reducing the 30 social indicator variables to 4 general attribute dimensions is recognized. The argument can be made that a single variable would suffice instead of a composite dimension based on many variables. However, to do so results in a loss of generality that a *dimension* of variables necessarily represents, which the resultant typology thereby includes.

It was decided to split each of the four social area dimensions into three value categories: high, medium, and low. The use of trichotomies in partitioning dimensions is a standard recommended procedure in typology construction using the BCTRY programs. Furthermore, the content of the four general attribute dimensions lent itself nicely to trichotomizing. Even so, using the four dimensions that were identified above, each partitioned into three categories (high, medium, or low), 81 different combinations are possible.[8]

Clearly, 81 different possible combinations of census tracts is not a satisfactory summary of the social area structure for most purposes. The value of the BCTRY O-analysis computer program is realized in its procedures for identifying which of the 81 combinations actually exist in the data and on its capacity to refine those combinations that actually exist into a small, manageable number of unique groupings (types).

The initial procedure of the object clustering (i.e., typology) program is to classify each census tract in its specific type on the basis of its pattern of scores across the 4 dimensions. For example, census tracts that were "high" on all four dimensions (only 1 of 81 possible combinations) were identified and grouped, as were census tracts for each of the other 80 combinations. Only 26 score patterns were actually found to occur in

⁸The number of combinations mathematically possible is given by the formula S = Cᵏ, where S the number of sectors combinations is equal to C the number of score categories (values) on a dimension raised to the power of k, the number of dimensions. See Tryon and Bailey, 1970, p. 54.

the data out of a possible 81. Many of these 26 contained only 1 or 2 census tracts, and, therefore, did not constitute salient "core types." The computer program subsequently proceeds to identify which groups of census tracts are salient "core types" and to reclassify those census tracts that are not members of these "core types." Because this reclassification process may change the overall membership of the core types, and hence their substantive interpretation, the whole procedure is performed a number of times until membership groupings are relatively stable.

Table A-2 presents the results of the procedures described above. It shows that the largest number of census tracts, 54 (approximately one-fourth of all tracts), are in a type that is moderate on all four dimensions. T-is particular type was designated WORKSUB, reflecting that it has the characteristics of lower-middle and working-class suburban neighborhoods. Other specific types that are like WORKSUB in most ways, but differ slightly in racial composition or housing are ETHMIX, a type in which the percentage of black other population is somewhat higher than in WORKSUB (which is mainly white), and CENTRAL, which has lower-middle or working-class population characteristics but central-city-like housing characteristics (apartments and multi-family dwellings).

The table also indicates that a substantial number of census tracts in Westchester County (specifically 32) are low socioeconomic status, high social problem tracts, namely those in social areas HIPROB and MEDPROB. Thus, approximately one-sixth of the tracts are decidely disadvantaged in relation to the others. In fact, the two specific types that fulfill that definition constitute the second largest group of census tracts in the county.

The stereotype usually associated with Westchester County—upper and upper middle-class suburbia—is represented by two or more specific types listed in Table A-2. These are HIWEALTH and MEDSUBURB. Particular mention should be made of COUNTRY and SINGLEMAN, two specific types with housing and social status characteristics similar to, but somewhat less well-to-do than HIWEALTH and MEDSUBURB. SINGLEMAN is a somewhat difficult type to explain because its predominant differentiating characteristic is its "high" value on the sex composition dimension. This value reflects a population that is more male than female and higher proportions of males who are single. The eight tracts that comprise this type are otherwise
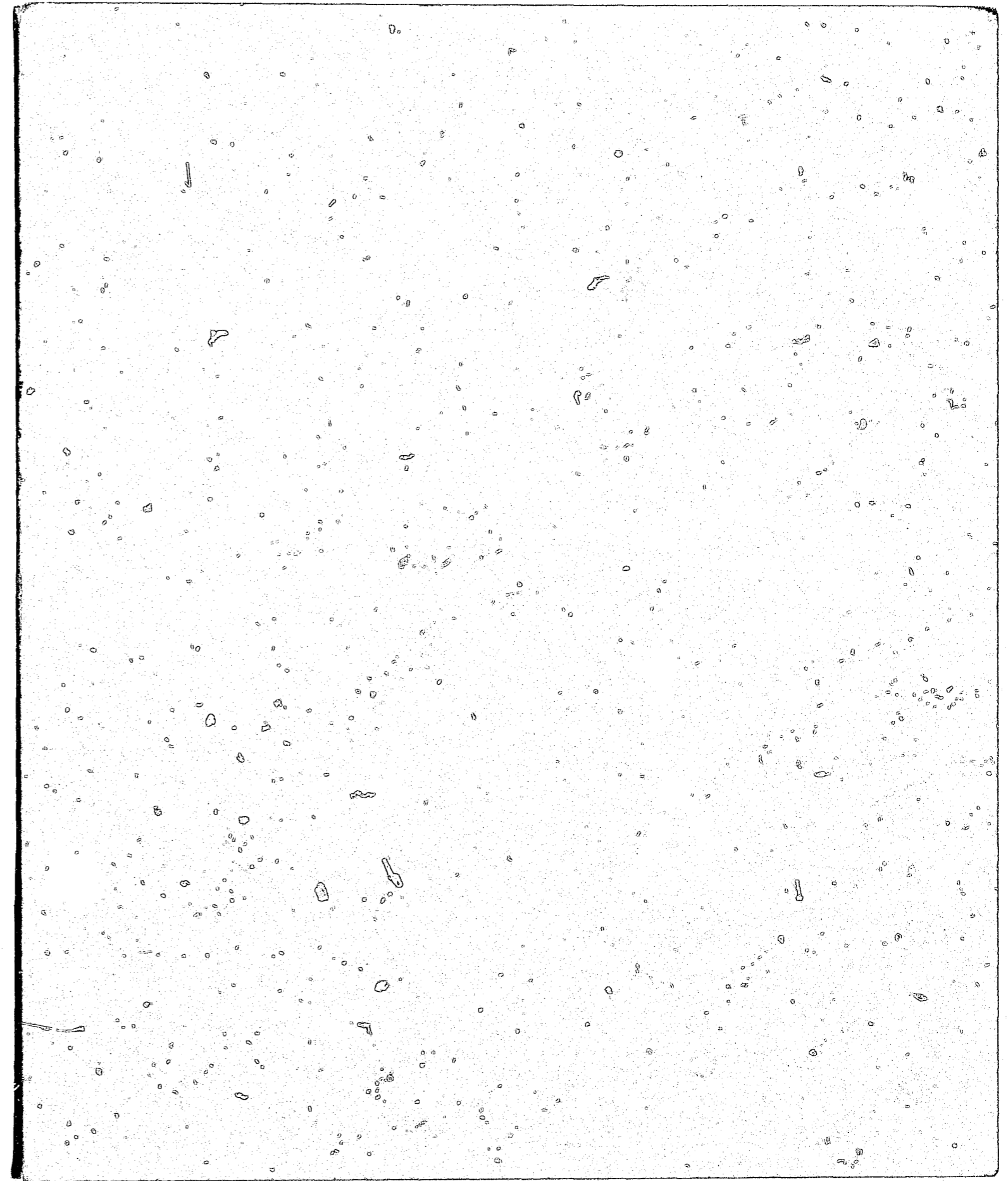
TABLE A-2 Attributes and robbery rates of social areas,
Westchester County, 1970

SOCIAL AREA ATTRIBUTE DIMENSIONS[b]

Social Area Type[a]	Number Of Census Tracts	Housing structure (size, price, ownership)/ Household size	Social Prob-lems	Male household heads/ Males over 14	Socio-economic Status	Homogeneity Across Attribute Dimen-sions[c]	ROBBERY RATE OF CENSUS TRACT (per 1,000 persons) Mean	Homogeneity Of Rob-bery Rate[c]
CENTRAL(1)	29	Low	Med	Med	Med	.92	0.8668	.80
ETHMIX(3)	13	Med	Med	Low	Med	.84	0.7896	.95
WORKSUB(4)	54	Med	Med	Med	Med	.93	0.7383	.88
MEDSUBURB(5)	23	Med (High)	Med	Med	High	.94	0.1433	.99
HIPROB(7)	13	Med	High	Low	Low	.87	4.4478	-1.94
MEDPROB(8)	19	Med	High	Med	Low	.90	2.6961	-.80
HIWEALTH(9)	11	High	Med (Low)	Med	High	.93	0.3226	.96
COUNTRY(10)	28	High	Med	Med	Med	.93	0.2463	.98
SINGLEMAN(12)	8	High	Med	High	Med	.95	0.5544	.97

[a]The numbers in parentheses after the social area type name serve two purposes. In the computer program, these types are designated by such numbers. The numbers in parentheses are the original type numbers; the missing numerals 2, 6, and 11 reflect that these types were combined into other types as a result of the reclassification procedure explained above. The original numbers make it possible for the interested reader to follow the development of the reclassification process in the more extensive documentation in Dunn, 1974. Second, the numbers are used in the text tables to indicate how these nine specific social area types were grouped into three broad groupings more appropriate for analyzing the distribution of crime incident characteristics.

[b] See pp. 38-39 above for definition of the content of these dimensions. Also found there is a specific description of what "high," "medium," and "low" mean for each dimension.

[c] See p. 42 below for definition and discussion of homogeneity statistic.

very much like those in COUNTRY, which are tracts that are in the relatively more rural portions of the county.

Table A-2 also presents a statistic called the "homogeneity" of each type. It is a measure of how similar, across all four attribute dimensions, the census tracts in any specific type are in relation to all the census tracts. The measure varies from 1.00 to 0. If a homogeneity approaches 1.00, this means that the variation of individual census tracts in a social area type is nil. In other words, each census tract of the type is almost exactly like every other census tract of the type. In fact, if the homogeneity is 1.00, the members are identical in their score profiles on the attribute dimensions. If the homogeneity approaches zero, this indicates that the census tracts of a particular type are quite dissimilar on their score profiles. As Table A-2 shows, the homogeneity of each social area type across the attribute dimensions is quite high. In other words, each of the nine specific social area types is composed of census tracts that have quite similar patterns of score profiles on the attribute dimensions.

The BCTRY program also includes a routine that allows the analyst to determine, for each type, its score and homogeneity on variables not used to create the typology. This was done for the overall robbery rate in each census tract. These data are also shown in Table A-2. For all social area types except HIPROB and MEDPROB, robbery rates are relatively homogeneous. The reason that the two areas with high robbery rates have low homogeneity of robbery rates is that only one or two of all the census tracts in those types have extremely high robbery rates.

Finally, it should be pointed out that the robbery rate information was helpful in further refinement of the social areas. When the distribution of robbery incident characteristics among the nine social areas was first analyzed, the problem of case attenuation arose. That is, some social areas contained too few sample cases to warrant extensive breakdowns. Therefore, the robbery rate information was used in conjunction with the social area types to define three basic groupings of the social area types. These groupings were: HIPROB and MEDPROB, a high social problem/low socioeconomic status/high robbery rate group; CENTRAL, ETHMIX, WORKSUB, and SINGLEMAN, a group that has moderate robbery rates and are basically working-class or middle-class neighborhoods (as well as more urban than the last group); and MEDSUBURB, HIWEALTH, and COUNTRY, three specific areas that have low robbery rates and are essentially an upper-middle-class neighborhood grouping.

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