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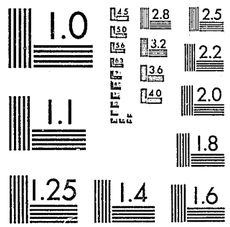

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12/13/85

The Patterns and Distribution of **Assault Incident Characteristics** Among Social Areas

U.S. Department of Justice
National Institute of Justice

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ANALYTIC REPORT 14

The Patterns and Distribution of ASSAULT INCIDENT CHARACTERISTICS Among Social Areas

by **Christopher S. Dunn**
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Albany, New York

NCJRS

JUL 15 1977

ACQUISITIONS

This project was supported by Grant No. 72-SS-99-6006, awarded to the Criminal Justice Research Center, Albany, New York, by the Statistics Division, National Criminal Justice Information and Statistics Service, Law Enforcement Assistance Administration, U.S. Department of Justice, under the Omnibus Crime Control and Safe Streets Act of 1968, as amended; the project, entitled "Utilization of Criminal Justice Statistics," is being directed for the Criminal Justice Research Center by Michael J. Hindelang and monitored for LEAA by Sue A. Lindgren. Points of view or opinions stated in this document are those of the author(s) and do not necessarily represent the official position or policies of the U.S. Department of Justice.

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Library of Congress Cataloging in Publication Data

Dunn, Christopher S.
The patterns and distribution of assault incident characteristics among social areas.

(Analytic report - Utilization of Criminal Justice Statistics Project; 14)
Supt. of Docs. No.: J1.42/3: SD-AR-14
Bibliography: p. 37
1. Assault and battery—United States. I. Title.
II. Series: Criminal Justice Research Center. Utilization of Criminal Justice Statistics Project. Analytic report - Utilization of Criminal Justice Statistics Project; 14.
HV6618.D86 364.1'55 76-49961

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402
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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

THE AUTHOR is especially indebted to Lawrence E. Fine of the Westchester Community Service Council, Inc., for providing the data base of the "Crime and Service Study of Westchester County, N.Y." for secondary analysis. The analysis and interpretation of those data in this report is the sole responsibility of the author. Any errors or omissions should in no way reflect on the foresight and good offices of the Westchester Community Service Council for their commendable and unique data collection efforts.

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The Patterns and Distribution of **ASSAULT INCIDENT CHARACTERISTICS** Among Social Areas

Introduction

IT IS EVIDENT from criminological research that crime occurrence, even for a single offense, is not a one-dimensional phenomenon. Crimes in any particular legal category—for example, assaults—occur in a variety of places, under a host of different circumstances, perpetrated by different kinds of people against similarly diverse victims. This report explores some of the patterns of and relationships between two basic dimensions of assaults: the spatial (that is, areas in which assaults occur), and the constituent (that is, the salient features, characteristics, or elements of an assault incident).

Each of these dimensions has been analyzed *independently* in previous studies. For example, Schmid (1960a,b) and Boggs (1965) have included aggravated assault in their studies of offense and arrestee distributions in census tracts in Seattle and St. Louis, respectively. On the other hand, Pittman and Handy (1964), the President's Commission on Crime in the District of Columbia (1966), Mulvihill, Tumin, and Curtis (1969) for the National Commission on the Causes and Prevention of Violence, and to a limited extent, Pokorny (1965) have examined the nature of assault characteristics. These characteristics have included the age, sex, and race of offenders and victims, the interpersonal relationship between offender and victim, the weapon or means of force used in the offense, and the location at which the offense took place (e.g., residence or street).

The objective of the current research is to examine in more detail how the two dimensions may be related. That is, since assaults occur in different places or areas within cities, and since assault characteristics also exhibit variation (e.g., some are committed by juveniles, some by adults; some are committed in residences by females, some outdoors by males), it may be the case that assault *characteristics* exhibit patterns of geographic variation.

Characteristics of Aggravated Assaults

Like most offense-specific research in criminology, major efforts have been devoted to identifying, describ-

ing, and often interrelating essential elements or salient features of an offense class. In the case of aggravated assault, studies have frequently occurred in conjunction with research on homicide.[1] Assaults are often considered as homicide attempts that have failed as a result of medical intervention, absence of a weapon, or perhaps pure luck. Although the intent of a small number of aggravated assaults may have been homicide, it is not warranted to assume the complete equivalency of aggravated assaults with homicide. The reported rate of aggravated assault in the United States in 1970 was slightly more than 20 times greater than that of murder and nonnegligent manslaughter (162.4 reported aggravated assaults per 100,000 persons versus 7.8 murders and nonnegligent manslaughters per 100,000 persons).[2] Given this disparity in rates, it is difficult to imagine that even one-quarter of all aggravated assaults were attempted homicides or would have been homicides except for the intervention of medical care.

Our knowledge of aggravated assault may be limited by the tendency to link it with homicide. For example, much has been written recently about the victim/offender relationship in homicide that has been carried over to other violent offenses. The finding that a primary family or close friend relationship existed between parties in a violent offense cannot be assumed to explain the motivation or activities of those persons. In fact, data show that the frequency of particular victim/offender relationships varies according to kind of violent offense. Table 1 presents the nature of the victim/offender relationship by type of offense. These data were taken from a survey of police crime statistics in 17 American cities conducted for the National Commission on the Causes and Prevention of Violence by Mulvihill, Tumin and Curtis (1969). They suggest that more intimate victim/offender relationships are related to more serious offenses. But even here, the inferences that can be drawn about the nature of the event are limited. It may well be that homicides involving family members evolve from a pattern of repeated hostility and previous unreported attacks, whereas assaults involving family members may more often be attempted homicides nipped in the bud.

Assault may have some characteristics similar to homicide, but it probably also has characteristics that are unique. The Task Force on Individual Acts of Violence of the National Commission on the Causes and Prevention of Violence reported that the motive for about 8 percent of all aggravated assaults was escaping arrest, whereas less than 1 percent of all homicides were committed pursuant to escaping arrest.[3] Robbery, on the other hand, was the motive in only about 2 percent of all assaults, although about 9 percent of the homicides were committed in the course of a robbery.[4] The most frequent motive for both offenses was "altercation" (a dispute or argument), but the relative frequency of that category differed slightly—about 36 percent of the homicides and 30 percent of the aggravated assaults involved altercations.

"Unknown" was the most frequent category of motive for aggravated assaults, accounting for approximately 40 percent of the cases.[5] This percentage differed substantially from the "unknown" category for homicides (21 percent), rape (0.7 percent), and robbery (about 1 percent).[6] Although information about motive may be missing as a result of inefficient police reporting, it may also be much more difficult to ascertain for assaults than for the other violent offenses. Especially in the case of stranger-to-stranger assaults, the victim (upon whom the police may have to rely for much of the information about the incident) may have no idea about why he was attacked. Thus, the "unknown" category for motivation reflects one of the important elements of aggravated assault in relation to other violent offenses. Because many aggravated assaults are apparently random, unprovoked, unexplainable attacks, it is difficult to obtain comprehensive information about the characteristics of the offense. For that reason, as well as the relative concentration of descriptive research on homicide, the extent of information about assaults is limited.

[1] See for example, A. Pokorny, "Human Violence: A Comparison of Homicide, Aggravated Assault, Suicide, and Attempted Suicide," **Journal of Criminal Law, Criminology and Police Science** 56(1965): 488-497; President's Commission on Crime in the District of Columbia, **Report of the Commission** (Washington, D.C.: U.S. Government Printing Office, 1966); D.J. Mulvihill, M.M. Tumin, and L. A. Curtis, **Crimes of Violence**, v. 11 (Washington, D.C.: U.S. Government Printing Office, 1969).

[2] J.E. Hoover, **Crime in the United States 1970.** Uniform Crime Reports (Federal Bureau of Investigation, U.S. Department of Justice, 1971).

[3] Mulvihill, Tumin and Curtis, p. 349.

[4] Ibid.

[5] Ibid.

[6] Ibid.

TABLE 1 Offender/victim relationship in selected violent offenses

[In percent]

Offender/victim relationship	OFFENSE				
	Criminal homicide (N=668)	Aggravated assault (N=1, 493)	Forcible rape (N=617)	Armed robbery (N=509)	Unarmed robbery (N=502)
Primary:					
Husband/wife (legal, common law)	15.8	9.4	0.0	0.6	0.0
Other family (parent/child, brother, sister)	8.9	4.5	6.9	0.0	0.5
Other primary (close friend, paramour, homosexual partner)	9.0	6.7	3.3	0.4	0.1
Subtotal, primary	33.7	20.6	10.2	1.0	0.6
Nonprimary:					
Prostitute, acquaintance, neighbor, business relation, sex rival or enemy	28.1	25.3	32.6	12.2	10.9
Stranger	15.6	20.6	52.8	78.3	85.7
Felon or police officer	1.7	10.1	0.3	0.0	0.2
Subtotal, nonprimary	45.4	56.0	85.7	90.8	96.8
Unknown	20.9	24.3	4.1	8.2	2.6
Total, primary, nonprimary, unknown[a]	100.0	100.0	100.0	100.0	100.0

Total number of offender-victim interactions = 3,789

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

Source: Mulvihill, Tumin and Curtis, 1969, p. 349. (See Appendix A.)

Variation in characteristics of aggravated assault is, however, well-documented in a few empirical studies. Substantial differences in assaults have been noted with respect to variables such as age, sex, and race of both offenders and victims, interpersonal relationships among offenders and victims, weapons or means of force used in the offense, site of the offense (residence, bar, street, etc.), and number of participants. Tables 2, 3, 4, and 5 present the frequency distributions of some of those variables, as specified in four selected studies of aggravated assault.

In addition to the relative frequency distributions of these characteristics—offender/victim race and relationship, weapons or means of force used, and assault occurrence locations—these tables also indicate that such distributions are somewhat similar across the jurisdictions examined. The similarity of assault incident characteristics is especially noted in regard to the

two studies presenting information about assault *across a number of jurisdictions*. (The data from Mulvihill, Tumin, and Curtis [1969]were collected from a 17-city survey; the data analyzed here concern assaults in Westchester County, New York collected from some 39 municipal police jurisdictions, the New York State Police, and the Westchester County Parkway Police.[7])

[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), for a complete description of the data base on which this research was focused. Briefly, 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.

The frequency distributions of various offender/victim racial combinations are similar in all four studies (see Table 2). Assaults in which black offenders attack black victims are consistently the most frequent type. However, the frequency of this type decreases as the number of jurisdictions involved in each study increases, a factor which probably indicates an increased mix (heterogeneity) in the racial composition of the population. White offenders attacking white victims is generally the next most frequent type of assault; however, in two instances (the District of Columbia and Westchester County), black offender/white victim interracial assaults are very nearly equal to the relative frequency of white offender/white victim assaults.

The pattern of offender/victim relationships probably varies the most of any characteristic across the jurisdictions (see Table 3). Assaults involving family

TABLE 2 Racial composition of aggravated assaults, selected studies

[In percent]

Offender/victim race dyad	St. Louis[a] (N=238)[e]	District of Columbia[b] (N=121)[f]	17 American cities[c] (N=871)[g]	Westchester County[d] (N=164)[h]
White offender/white victim	16.8	6.6	23.9	25.6
White offender/black victim	0.8	3.3	1.8	2.4
Black offender/white victim	3.4	5.8	8.4	25.0
Black offender/black victim	79.0	84.3	65.9	47.0
Total	100.0	100.0	100.0	100.0

[a] Source: Pittman and Handy, 1964, p. 468.

[b] Source: President's Commission on Crime in the District of Columbia, 1966, p. 78.

[c] Source: Mulvihill, Tumin, and Curtis, 1969, p. 271. (See Appendix A.)

[d] Source: Dunn, 1974, p. 252. The race category "black" includes all persons other than white.

[e] Offender/victim race not reported in 3 cases; total N=241.

[f] Offender/victim race not reported in 10 cases; total N=131.

[g] Offender/victim race not reported in 622 cases; total N=1,493.

[h] Offender/victim race not reported in 153 cases; total N=317.

TABLE 3 Offender/victim relationship in aggravated assaults, selected studies

[In percent]

Offender/victim relationship	St. Louis[a] (N=241)	District of Columbia[b] (N=131)	17 American cities[c] (N=1,493)	Westchester County[d] (N=317)
Kinship	19.5	20.6	13.9	9.8
Husband/wife		10.7	9.4	
Other family		9.9	4.5	
Close friend, lover, commonlaw or acquaintance	NA	60.3	31.0[e]	16.4
Stranger or no relationship	80.5[f]	19.1	30.7[g]	44.8
Unknown, or not reported	NA	NA	24.3	29.0
Total[h]	100.0	100.0	100.0	100.0

[a] Source: Pittman and Handy, 1964, p. 465.

[b] Source: President's Commission on Crime in the District of Columbia, 1966, p. 78.

[c] Source: Mulvihill, Tumin, and Curtis, 1969, p. 287. (See Appendix A.)

[d] Source: Dunn, 1974, p. 252.

[e] Includes close friend, paramour, homosexual partner, prostitute, acquaintance, neighbor, business relation, and sex rival or enemy.

[f] This percent is undoubtedly high. In their Table 6, Pittman and Handy, 1964, p. 465, present kin relationship dichotomized as kin/not kin. The percent presented above (80.5) is that for "not kin." However, in a subsequent table (their Table 15), Pittman and Handy, 1964, p. 468, describe (for a limited number of cases, N=50) the relationship between "offender/victim acquaintance" and "sex of offender and victim." One category of "offender/victim relationship" is given as "former close relation." The marginal total of 25 cases for this class does not exhaust the possible number in that class, since the data in the table pertain only to assaults in which offenders and victims were of opposite sexes. Thus, at least 10.4 percent of the 241 total N had "former close relationships," but quite possibly more.

[g] Includes 20.6 percent stranger and 10.1 percent felon or police officer.

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

members generally account for between 10 percent and 20 percent of all assaults. That range includes those assaults for which specific kinship relationship (that is, spouse or other family member) was not distinguished. However, large differences in relative frequency are noted for assaults involving acquaintances (or other non-kinship relationships) and for assaults involving strangers. Interestingly, information about family or other relationships is not reported or is missing in about the same proportion for two studies: 24.3 percent in Mulvihill, Tumin, and Curtis (1969); and 29 percent in Westchester County, New York (Dunn, 1974).

The type of weapon or means of force employed in assaults is also relatively similar in those two studies

(see Table 4). The most common means was the use of personal force (hands, feet, or any part of the body), followed closely by the use of knives. One-quarter to one-third of assaults in these two studies involved knives.

It may have been observed from the many explanatory footnotes on these tables (Tables 2, 3, 4, and 5) that there were differences among categories that had to be resolved before appropriate comparisons could be made. The set of categories most diverse among these studies was the location of occurrence. For that reason, it was necessary to collapse the location categories into three more inclusive ones. Generally speaking, "inside residence" pertained to houses or apartments; "inside other" pertained to places of entertainment or other recreation, or to stores, businesses, offices; "outside" is self-explanatory, but includes, in addition to street (the most frequently listed specific subcategory), such places as parks, playgrounds, and vacant lots. The data about location of occurrence indicate that about one-half of assaults occur outside, whereas, with one exception, between one-quarter and one-third occur in residences (see Table 5).

Although these comparative frequency data are instructive, a major thrust of criminological research has been correlational. In other words, major analytical

TABLE 4 Means of force used in aggravated assaults, selected studies

[In percent]

Means of force	St. Louis[a] (N=241)	District of Columbia[b]	17 American cities[c] (N=1,461)[e]	Westchester County[d] (N=271)[f]
Personal force[g]	5.8		41.3[h]	37.6[i]
Weapon		53 - 1960[j] 60 - 1964 67 - 1965		
Knife	52.3		26.5	33.9
Gun	16.2		13.2	8.9
Other	25.7		19.0[k]	19.6[l]
Total	100.0		100.0	100.0

[a] Source: Pittman and Handy, 1964, p. 465.

[b] Source: President's Commission on Crime in the District of Columbia, 1966, p. 79.

[c] Source: Mulvihill, Tumin, and Curtis, 1969, p. 345.

[d] Source: Dunn, 1974, p. 253.

[e] Weapon or means not reported in 32 cases; total N=1,493.

[f] Weapon or means not reported in 46 cases; total N=317.

[g] Includes fists, feet, or any part of body.

[h] Includes 334 "body" cases and 269 "no harm" cases.

[i] Includes 101 "hands/feet" cases and one "verbal threat" case.

[j] Data on means of assault were only presented as the overall percent involvement of weapons without distinction as to kind, for the years listed.

[k] Includes 174 "blunt instrument" cases, one "poisoning" case, and 103 "other" cases.

[l] Includes four "chemicals" cases and 49 "multiple - not distinguished" cases.

TABLE 5 Location of aggravated assaults, selected studies

[In percent]

Location	St. Louis[a] (N=241)	District of Columbia[b] (N=110)[e]	17 American cities[c] (N=1,460)[f]	Westchester County[d] (N=262)[g]
Inside residence	37.8	56.4	26.9	24.4
Inside other	11.2	NA	19.8	24.4
Outside (street, other)	51.0	43.6	53.3	51.2
Total	100.0	100.0	100.0	100.0

[a] Source: Pittman and Handy, 1964, p. 464.

[b] Source: President's Commission on Crime in the District of Columbia, 1966, p. 79.

[c] Source: Mulvihill, Tumin, and Curtis, 1969, p. 221. (See Appendix A.)

[d] Source: Dunn, 1974, p. 255.

[e] Location of occurrence not reported in 21 cases; total N=131.

[f] Location of occurrence not reported in 33 cases; total N=1,493

[g] Location of occurrence not reported in 55 cases; total N=317.

efforts have been devoted to assessing the interrelationships among various offense characteristics.

Some interrelationships among assault characteristics have been used to explain assault occurrence as a function of gatherings at normal times or places for various activities. For example, Pittman and Handy (1964:464-465) found that if the offender and victim were related, the assault tended to occur in a residence. This was explained as a function of a tendency for related persons to interact mainly in their own homes. In a second example of this theory, Pittman and Handy argued (1964:464) that assaults occurring indoors involved females more often than males, as a consequence of a general tendency for females to spend the "majority of their time indoors." This argument lacks persuasiveness. A more appropriate explanation may be found in their own findings that females were more likely than males "to aggress against one with whom there is some intimate relationship," and that such assaults involving kin or persons of other intimate relationships tended to occur in a residence.[8] Still another example of an explanation of assault occurrence as a function of where people happen to interact is the general tendency identified by Pittman and Handy for assault to occur on a public street during evening hours when street activity is largely leisure-time oriented and non-organized. Since more people in certain locales tend to be about in the evening hours for recreational or social purposes, there are more chances for interpersonal contacts to escalate into violence.

These findings by Pittman and Handy indicate that assault often occurs as a function of interactions in situations that engender conflict. If the nature of social activity is also a function of certain area characteristics (that is, if different kinds of activities prevail in different places), it is also likely that the nature of conflict-pro-

[8] D.J. Pittman and W. Handy, "Patterns in Criminal Aggravated Assault," **Journal of Criminal Law, Criminology and Police Science** 55(1964):468.

ducing situations differs among areas. Consequently, variations in characteristics of assaults that evolve in different places and situations may be related to social and other characteristics of the areas.

Social Areas and Assault Occurrence

To examine the above proposition, it was necessary to classify assaults in two ways and compare those classifications. Obviously, one set of classifications—the descriptive—pertained simply to each of the variables presented in Tables 2, 3, 4, and 5, as well as to some other characteristics of assaults. However, it was also necessary to classify the assault incidents according to the areas in which they occurred, or in other words, in terms of spatial dimensions and attributes.

The basis of the classification of assault in terms of a spatial dimension was the classification of the 205 census tracts in Westchester County into social area types. Once the 205 census tracts had been grouped into a much smaller set of *nine social areas*, each assault incident could be assigned to a social area type. This was possible because the census tract in which each assault 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.[9] 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 social variables):

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

Appendix B presents a more complete discussion of the methods involved in creating this typology of areas. A description of each of the four sets of attributes begins on page 31.

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). 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 types of areas were basically 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 females, and proportions of female heads of households. The tracts included in each of the social area types were not 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 B-2 in Appendix B 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 assault* were taken into account. Table B-2 also indicates that social areas HIPROB(7) and MEDPROB(8) had relatively high rates of assault; that social areas CENTRAL(1), ETHMIX(3), and HIWEALTH(9) had moderate rates of assault; and that WORKSUB(4), MEDSUBURB(5), COUNTRY(10), and SINGLEMAN(12) had low rates of assault. In the analysis that follows, these three combined sets of social areas are the basic groupings used.[10]

[9]Dunn, 1974, pp. 128-188.

[10]The numbers in parentheses after each social area type name serve two purposes that are explained in footnote (a) on Table B-2 in Appendix B. As reported there, the reasons for collapsing the nine specific area types into three larger groupings involve the rate of assaults in those groupings 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 which were not only similar in social attributes, but also similar in *rates* of assault. Furthermore, collapsing the nine specific area types prevented case attenuation that would have occurred in cross-tabulations because of the small number of incidents in some specific area types.

Assault Characteristics and Social Areas of Occurrence

In addition to the typology of areas of assault occurrence, it is possible to consider the characteristics of assaults (such as those discussed above) as another dimension by which to classify assaults. Each characteristic (e.g., race, weapon, or location) constitutes one unique attribute class, and the types in each class refer to specific assault characteristics such as "white offender, black/other victim" assaults, or "assaults involving knives."

Once the two classifications for assault incidents (the attribute classes and the area types) had been created, the analysis of the interrelationships among assault characteristics and social areas of occurrence was begun. In the same way that a researcher can cross-classify or cross-tabulate assaults versus robberies among different jurisdictions, the joint occurrence of incident characteristics and areas of occurrence was analyzed. That is, the distribution of characteristics among the three general assault rate/ social attribute area types was examined by cross-tabulating incident characteristics of the assault against the social area type in which the assault took place.

Table 6 shows the relationship between race of offenders in assaults and social areas of occurrence. The table shows, for example, that although 71.4 percent of all assaults reported to police (in which race of offender was known, reported, and recorded) involved black/other offenders, this percent was 90.9 in the high assault rate areas. Because these areas are also areas in which the proportion of black/other population is greatest, one might expect that the proportion of black/other assault offenders would also be high. Whereas the mean proportion black/other population in HIPROB(7) and in MEDPROB(8) is about 57 percent and 23 percent, respectively, the reported proportion of black/other offenders in each is much higher, about *91 percent*. Another interesting aspect of the table concerns the relative absence of black/other offenders from low assault rate, predominantly white social areas. While 71.4 percent of assault offenders were black/other across the county, in the low assault rate, low percentage black/other (about 4 percent) social areas (4, 5, 10, and 12) only 30.4 percent of the assault offenders were reported to be black/other. However, even this 30.4 percent is well above the 4 percent average black/other population in these areas.

The overall relationship between race of offender and extent of assault problem is given by the gamma value in Table 6 of 0.80. That is, the higher the level of assault rate and a variety of other social problems, and the lower the scoioeconomic status in social areas, the more likely it is that aggravated assault offenders will be black/other. Concurrently, it must also be stated that the greater the proportion of residents who are black/other, the higher the proportion of black/other assault offenders and the higher the rate of assault. In all three social area groups, the proportion of offenders who are black/other exceeds the proportion of residents who are black/other.

Table 7 presents similar data regarding the race of victims of assault in relation to the character of the social area in which the assault incidents occurred. The data reflect the same relationship that characterized race of offender. That is, the higher the rate of assault and correspondingly high overall social problems and low socioeconomic status in a social area, the more likely it is that the victim will be black/other. Whereas about 50 percent of all victims of assault were black/other throughout the county, in the high assault rate, high proportion black/other social areas, 65.8 percent of the victims were black/other. In the low assault rate, low proportion black/other social areas, only 18.2 percent of the victims were black/other. The overall strength of this relationship is given by the gamma value in Table 7 of 0.65.

In view of the high proportions of black/other assault offenders and black/other assault victims, and the high rates of assault in areas with greater proportions of black/other population, assault in Westchester County is essentially a black/other phenomenon. However, the difference between percentage of black/other offenders and percentage of black/other victims suggests that some relatively small proportion of assault is interracial. The data in Table 8 reflect that the proportion of interracial assault does not vary greatly in relation to the nature of social areas and assault occurrence in the county.

On the other hand, however, it is extremely interesting to examine the nature of the interracial assaults in relation to their distribution among social areas. Table 9 shows that the great proportion of interracial assault, 91.1 percent, involves black/ other offenders and white victims. However, there are substantial

TABLE 6 Race of offender by social area of assault, Westchester County, 1970

[In percent]

Race of offender	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[a]	Moderate rate (1, 3, 9)[a]	High rate (7, 8)[a]	Percent of total (N=196)[b]
White	69.6	35.0	9.1	28.6
Black/other	30.4	65.0	90.9	71.4
Percent of total (N=196)[b]	23.5	20.4	56.1	100.0

Gamma=0.80

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B, p. 35. 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 7 Race of victim by social area of assault, Westchester County, 1970

[In percent]

Race of victim	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[a]	Moderate rate (1, 3, 9)[a]	High rate (7, 8)[a]	Percent of total (N=197)[b]
White	81.8	61.1	34.2	49.7
Black/other	18.2	38.9	65.8	50.3
Percent of total (N=197)[b]	22.3	18.3	59.4	100.0

Gamma=0.65

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B, 35, 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 8 Intra-racial versus interracial assault by social area of assault, Westchester County, 1970

[In percent]

Race of victim and offender	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[a]	Moderate rate (1, 3, 9)[a]	High rate (7,8)[a]	Percent of total (N=162)[b]
Same	77.8	67.9	71.4	72.2
Different	22.2	32.1	28.6	27.8
Percent of total (N=162)[b]	22.2	17.3	60.5	100.0

Gamma=0.08

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B, p. 35, 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 9 Type of interracial assault by social area of assault, Westchester County, 1970

[In percent]

Type of interracial assault	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[a]	Moderate rate (1, 3, 9)[a]	High rate (7, 8)[a]	Percent of total (N=45)[b]
White offender, black/other victim	37.5	11.1	0.0	8.9
Black/other offender, white victim	62.5	88.9	100.0	91.1
Percent of total (N=45)[b]	17.8	20.0	62.2	100.0

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B. p. 35, 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.

differences in this frequency, according to differences in level of the assault problem and differences in the proportion of the population that is black/other. The data in Table 9 show that all (100 percent) interracial assaults which occurred in the high assault rate, high percent black/other social areas involved black/other offenders and white victims. Yet in the low assault rate, low percent black/other social areas, where comparatively fewer interracial assaults occur, this percent is substantially reduced.

The patterns of distribution of race of offender and victim among different social areas reflect some differences in the nature of assaults among social areas. To a large extent, assaults that occur in high assault rate, high percent black/other, high social problem, low socioeconomic status social areas involve both black/other offenders and black/other victims. The proportions of both black/other offenders and black/other victims are substantially less in low assault rate/ high percent white social areas. Generally, the relative frequency of intra-racial and interracial assault does not vary greatly from area to area. However, the nature of interracial assault does. In high assault rate, high percent black/other social areas, interracial assault involves black/other offenders and white victims exclusively, while in low rate/high percent white areas, interracial assaults tend to be more evenly divided between white offender, black/other victim assaults and black/other offender, white victim assaults. Thus, there appears to be substantial support for the idea that the race of assault offenders and victims, as well as patterns of interracial assault, are contingent upon the racial composition and associated social structure attributes of the areas in which assault occurs.

Another interesting characteristic to examine in relation to social areas of assault occurrence is the means of force or weapon with which the assaults are committed. Of the 267 assaults in the data base for which both weapon and social area information were available, only 1 involved simply a verbal threat, and only 4 involved the use of chemical substances of some kind. These two categories were too small for any further consideration, and the five cases involved were deleted from the analysis. The remaining categories are guns (9.2 percent), hands or feet (38.2 percent), knives (34.4 percent), and multiple means (18.3 percent).[11]

[11]These percentages, are based on 262 assault incidents, i.e., those having one of the four means/weapons categories as well as social area information.

Table 10 presents the distribution of the four most frequent categories of means of assault among the three basic assault occurrence/social attribute areas. The data show that the use of hands or feet is associated with the low and medium assault rate social areas, whereas the use of knives is associated with the high assault rate social areas. The use of guns is only slightly more frequent in the low rate social areas than the other areas, while "multiple" means are used at about the same rate in each assault occurrence area. There are, however, some interesting associations of particular weapons with specific social area types. Although not presented in tabular form here, the use of guns in WORKSUB(4) (a lower-middle, working-class, residential area) accounted for 15.6 percent of the assaults, compared with about 9 percent across all social areas. Although the use of multiple means in the high assault rate areas HIPROB(7) and MEDPROB(8) combined did not differ from the overall use of multiple means, there are substantial differences between HIPROB(7) and MEDPROB(8) with respect to multiple means. The use of multiple means in MEDPROB(8) was slightly over 30 percent, but only about 11 percent in HIPROB(7). Similarly, even though the use of hands or feet in HIPROB(7) and MEDPROB(8) combined is comparatively less than in other social areas, the use of personal force is less frequent in MEDPROB(8) (19.6 percent) as compared to HIPROB(7) (28.7 percent).

A measure of the overall association between possible seriousness of means of attack and social character of areas of assault occurrence was computed. Because it was difficult to assign the "multiple means" category to a rank that accurately reflected its position vis-a-vis seriousness, and because it was distributed in approximately the same relative frequency in each general set of social areas of assault occurrence, it was omitted from consideration of the overall relationship. Thus, the moderate gamma value of 0.31 indicates that to a limited extent, as the rates of assault and levels of other social problems in social areas increase, and as socioeconomic status decreases, the relative use of more serious means of attack increases.

The specific site at which assaults occurred may indicate more about the immediate setting out of which the assaults evolved. Those categories of site of occurrence that have enough incidents to warrant discussion of differences among social areas are apartment (19.1 percent.), private home (5.8 percent), parking lot or public garage (6.2 percent), restaurant or bar (10.5 percent), and street (38.1 percent). These five categories

TABLE 10 Means of force by social area of assault, Westchester County, 1970

[In percent]

Means of force	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[a]	Moderate rate (1, 3, 9)[a]	High rate (7, 8)[a]	Percent of total (N=262)[b]
Hands/feet	50.0	51.8	25.8	38.2
Knife	21.6	23.2	46.2	34.4
Gun	12.2	7.1	8.3	9.2
Multiple	16.2	17.9	19.7	18.3
Percent of total (N=262)[b]	28.2	21.4	50.4	100.0

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B, p. 35, 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.

account for almost 80 percent of the assault incidents in the sample.

Certain specific sites of assault tend to be slightly associated with particular social areas. Although assaults occurring in apartments were 19.1 percent of all assaults, assaults in apartments were 26.5 percent of assaults in CENTRAL(1), 27.3 percent of assaults in social area ETHMIX(3), and 26.5 percent of assaults in MEDPROB(8). Assaults in private homes were slightly more frequent in WORKSUB(4) (9.6 percent) than across all social areas (5.8 percent). Assaults in parking lots or public garages in MEDPROB(8) were 13.7 percent of assaults in that social area, but only 6.2 percent of assaults across all social areas. Assaults on the street were 38.1 percent of all assaults across all social areas, but 51.3 percent in HIPROB(7).

The categories of site of assault can be ordered in terms of degree of likely public access to sites. In terms of least public access to most public access, the sites are private home, apartment, restaurant or bar, parking lot or public garage, and street. The overall relationship between degree of likely public access to sites and level of assault occurrence is given in Table 11. The gamma value for this table of 0.12 indicates that no substantial relationship exists between privacy of immediate setting and nature of social areas of assault occurrence.

Thus, the data show that although there are some specific relationships between immediate setting of individual assault and social area type, there is no overall relationship between privacy of setting, social area attributes, and rates of assault. Furthermore, when the social areas were ordered in a different way than by extent of assault and other social problems, there was also only a slight relationship between privacy of immediate setting and overall residential and social problem status. In other words social areas MEDSUBURB(5), HIWEALTH(9), COUNTRY(10), and SINGLEMAN(12) were combined to form a high residential status/low social problem set of areas; CENTRAL(1), ETHMIX(3), and WORKSUB(4) formed a moderate residential status/moderate social problem set of areas; and HIPROB(7) and MEDPROB(8) formed a moderate residential status/high social problem set of areas. When this categorization of areas was related to probable public access to site of assault, the gamma value was only slightly higher, about 0.18. Generally speaking, then, the immediate setting of assault is only slightly related to the overall residential and social problem status of social areas, and even less strongly related to rates of assault

However, the association of specific categories of site of assault with particular social areas may suggest

TABLE 11 Location by social area of assault, Westchester County,1970

[In percent]

Location[a]	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[b]	Moderate rate (1, 3, 9)[b]	High rate (7, 8)[b]	Percent of total (N=205)[c]
Private home	8.8	10.5	5.5	7.3
Apartment	21.1	31.6	22.7	23.9
Restaurant or bar	19.3	15.8	9.1	13.2
Parking lot or public garage	5.3	5.3	10.0	7.8
Street	45.6	36.8	52.7	47.8
Percent of total (N=205)[c]	27.8	18.5	53.7	100.0

Gamma=0.12

[a] Ordered by degree of likely possible public access. Several sites of occurrence categories do not appear on this table because they contain too few incidents to warrant discussion.

[b] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B. p. 35, 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.

the possibility of particular sets of conditions that may account for such assaults in those social areas. For example, the association of assaults in apartments in CENTRAL(1) may occur because CENTRAL(1) (a central-city-like social area) has a large proportion of multiple-family dwelling units; however, it may also tend to reflect that assaults in this social area involve hallway muggings or domestic dispute beatings. The likelihood that this style of assault characterizes assault in CENTRAL(1) is further supported by the finding that hands or feet as means of attack was strongly related to CENTRAL(1). A different pattern of assault is noted in HIPROB(7). The occurrence of street assaults in this social area, as well as the use of knives, tends to indicate that assaults in HIPROB(7) may involve more recreational and social interpersonal contacts escalating into disputes. This pattern is also supported by the concentration in HIPROB(7) of the black/other female offender pattern of attack. The black/other female pattern of attack was identified elsewhere (Dunn, 1974:260) as a dimension of assault activity. Patterns of assault in which black/other females attacked an acquaintance, often a black/other male, with a knife accounted for about 4.5 percent of the assaults acress all social areas. However, in HIPROB(7) this specific pattern of assaults accounted for about 10 percent of all assaults, or more than twice its overall frequency throughout the county.

Age of offender and age of victim are two other assault characteristics that showed interesting differences among social areas of occurrence. For example, Table 12 shows that juvenile offenders (i.e., those 19 years or less) are slightly more prevalent in social areas that have low or moderate rates of assault.

TABLE 12 Age of offender by social area of assault, Westchester County, 1970

[In percent]

Age of offender	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[a]	Moderate rate (1, 3, 9)[a]	High rate (7, 8)[a]	Percent of total (N=166)[b]
Juvenile (19 years or less)	44.0	45.7	23.5	34.3
Adult (20 years or older)	56.0	54.3	76.5	65.7
Percent of total (N=166)[b]	30.1	21.1	48.8	100.0

Gamma=0.35

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B, p. 35, 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.

In low or moderate rate social areas, juvenile offenders were reported in about 44 percent and 46 percent of the assaults in these areas; overall, juvenile offenders were reported to account for only 34.3 percent of assaults. Conversely, adult offenders were reported more frequently than the overall percent in high assault rate social areas (65.7 percent compared to 76.5 percent, respectively). The overall relationship between age of offender and nature of area of assault occurrence is given in Table 12 by the gamma value of 0.35. The strength of this association and the pattern of the percentage differences in Table 12 suggest that, proportionately, *adult* assault offenders are somewhat more likely to commit offenses in high assault rate areas than juvenile offenders. That these areas are also high in other social problems lends support to the view that in such areas assault may be an element of a broader pattern of interpersonal conflict. The fact that juveniles in low and moderate assault rate areas form a much greater percentage of the offenders than in the high assault rate areas may indicate that assault is more episodic than cultural in origin.

Age of victim indicates about the same relationship to nature of area of assault occurrence as did age of offender, although the overall proportion of adult victims is slightly higher than the overall proportion of adult offenders (71.4 percent compared to 65.7 percent respectively). The overall relationship is in the same direction as that for age of offender; that is, juveniles tend to be victims of assault in low and moderate assault rate areas more frequently than expected, while adults tend to be victims of assault more frequently than expected in high assault rate areas. Table 13 persents these data, which show that the strength of the overall relationship, as indicated by the gamma value 0.35, is the same for age of victim as for age of offender. Thus, the age of victim data may be interpreted quite similarly to the age of offender data: higher concentrations of adult assault offenders and victims in areas high in other social problems may indicate a broader pattern of interpersonal tension and conflict that is cultural in origin; equal proportions of juvenile and adult offenders in the other areas may indicate a more episodic or situational type of assault problem.

Finally, two variables that did not show marked differences among social areas were the offender/victim relationship and the number of offenders involved in an incident (table not shown). Differences in proportions of stranger-to-stranger assaults, and in proportions of assaults in which the offender and the victim were related or acquainted, were minimal across the three basic areas of assault occurrence. Stranger-to-stranger

TABLE 13 Age of victim by social area of assault, Westchester County, 1970

[In percent]

Age of victim	SOCIAL AREA OF ASSAULT: Low rate (4, 5, 10, 12)[a]	Moderate rate (1, 3, 9)[a]	High rate (7, 8)[a]	Percent of total (N = 199)[b]
Juvenile (19 years or less)	38.8	39.5	20.5	28.6
Adult (20 years or older)	61.2	60.5	79.5	71.4
Percent of total (N = 199)[b]	24.6	19.1	56.3	100.0

Gamma = 0.35

[a] Numbers in parentheses identify specific social area types that comprise the three basic areas of assault rate/social attribute similarity. See p. 16 supra, and Appendix B, p. 35, 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.

assaults were about 66 percent of the assaults in the low assault rate social areas and about 62 percent in the moderate and high assault rate social areas. Assaults involving kin or acquaintances were about 34 percent and 38 percent in these areas, respectively. Assaults involving a lone offender were about 69 percent, 70 percent, and 75 percent in the low assault rate, moderate assault rate, and high assault rate areas, respectively. Clearly, there was not much difference among any of the three areas.

Discussion

This research has indicated that a variety of characteristics of aggravated assaults—for example, racial composition of assaults, various weapons or means of assault, various sites of assaults—tend to be distributed in different frequency among different kinds of social areas. In that sense, certain characteristics of assaults are related to social and other attribute differences among those areas.

Earlier, it was pointed out that patterns of relationships among assault characteristics have been used to make deductions or inferences about explanations of assault occurrence. It was noted that some past analysis of such interrelationships (Pittman and Handy, 1964:464-465, 468) suggested that aggravated assault tended to occur in a variety of situations, all having the common denominator of interpersonal interactions evolving into conflict. That is to say, certain sets of assault characteristics tended to vary together; when each set was viewed as a pattern of assault, the theme apparently underlying most of the patterns was the evolution of interpersonal contacts (of different sorts) into conflict situations. Examples used were husband/wife assaults in homes and street assaults occurring during leisure-time hours when more people tended to be on the street for recreational or social purposes. Thus, variation in characteristics of assaults apparently represent different patterns of interpersonal conflict situations.

After a short review of those patterns, it was suggested that there was a high likelihood that the nature of conflict situations also varied as a function of differences in attributes and activities in areas. Evidence in support of this proposition is taken from crime area studies, which show that various offenses are distributed in different frequency among areas of cities, and from research that indicates that the nature of other specific social problems also differs among areas (Dunn, 1974:128-188). The basic proposition is that if differences occur (and they do) between areas of assault occurrence, or between other sorts of social area attributes, is it not also likely that the *nature of conflict situations*—some of which evolve into assaults, some of which do not—may also vary among areas?

An aggravated assault data base was analyzed in regard to that general proposition. It was discovered that some characteristics of aggravated assaults were indeed concentrated in particular areas.

For example, race of offender and race of victim tended to be strongly associated with the racial composition of social areas. Persons other than white usually assaulted similar persons in social areas that had relatively larger proportions of other than white population. These areas—at least in Westchester County—were areas that also had the lowest socioeconomic status levels and the highest levels of other specific situations often defined as social problems—for example, nontraditional family structure, broken homes, welfare income, and substandard housing. Moreover, in interracial assaults, the offenders were always black/other if the assault occurred in one of the high social problem/low socioeconomic status social areas; if the interracial assault occurred in a predominantly white social area, chances were much greater that a white person would attack a person who is other than white (but were still not over 50 percent).

Other assault patterns pertained to differences among social areas in means of force or weapons used, and in specific sites of assault (street, residence, etc.). The relationships of means of force and specific sites of assault incidents to social areas of assault occurrence tended to indicate that assaults committed with knives and assaults committed on the street were associated with the high assault rate, high percent black/other, high social problem areas. In addition, a large proportion of assaults involving the black/other female pattern of assault—that is, attacks by black/other females on acquaintances, often black/other males, with knives—also occurred in those social area types. On the other hand, assaults in apartments and assaults involving the use of hands or feet were associated with a moderate assault rate area that had a large proportion of multiple-family dwelling units and quite possibly higher concentrations of white ethnic groups.

Age of offender and age of victim were associated to some extent with social areas of assault occurrence. Juvenile offenders and victims were slightly more frequent in low and moderate assault rate social areas, whereas adult offenders and victims were associated with high assault rate/ high social problem areas.

The differences among social areas in the frequencies of the patterns noted above support in some ways Pittman and Handy's proposition that assault is a function of gatherings at various times and places in which people interact in ways that result in interpersonal conflict. Certainly, the black/other female pattern of assault is evidence of that kind of a process, as is the use of personal or bodily force in apartments in a moderate status, mostly white, central-city-like social area. However, it is hoped that this research has contributed some ideas besides, or at least variations upon, the general conflict theme as an explanation of assault occurrence.

One such idea pertains to the apparent ecological/attribute/individual/characteristic relationship involving race. The finding that assault emanates from escalated interpersonal conflict situations has a substantial research base. However, that finding is developed in greater detail by specifying that—at least in Westchester County—the tendency is for assault to be intra-racial, but when interracial assaults do occur, they usually involve black/other offenders and white victims. Looking at the areas in which these different kinds of assaults occur extends the interpersonal conflict explanation even further. That is, the race of participants in the assault incidents, especially the race of offenders, tends to reflect the racial composition of the areas in which the assault occurred. Thus, our understanding of the race of assault participants, and indirectly of the conflict explanation for aggravated assault, is clearly enhanced by knowing the racial composition of the areas of occurrence. The racial composition of an area and many of its correlates may be indicators of, or in fact determine, the patterns of social activity that occur in an area, and hence the kinds of conflicts that may arise there.

It may also be likely—based on present observations—that these area attribute/assault characteristic relationships involve more components than simply race. Escalated interpersonal conflict as an explanation for assault does not tend to explain frequency differences in the area distribution of use of knives versus guns or bodily force, nor similar differences in the frequency of assault occurrence on streets versus occurrence in apartments, homes, or other inside locations. However, an understanding of assault differences in terms that include within-city or within-county varia-

tions in area attributes, institutions, and culture may help to account for the observed differences in patterns of assault. Wolfgang and Ferracuti (1967) have indicated that ready access to weapons or the carrying of knives and other weapons may be a symbol of participation in or requisite mode of, behavior for certain subcultural traditions, namely a subculture of violence. Similarly, differences among areas in institutions and opportunities—family structure, leisure-time activity, availability of transport—may result in the different patterns of behavior or different styles of interaction that prevail in various areas.

To the extent that assault characteristics and attributes of the social areas in which those assaults occur are associated, explanations for assault may be made more specific and precise than simply stating that assault is a function of conflict processes arising from the interaction of like kinds of people. Within-city differences in institutions and culture, as reflected by area differences in activities and vehavior, ultimately contribute to different forms and features of conflict. In tracing the patterns of these not-so-easily defined nor measurable forms and features, no attempt has been made to specify a *casual* sequence for the relationships that have been observed. To do so would presume specific knowledge of direct environmental forces and patterns of individual behavioral responses. Unfortunately, the data about assault and the social area attributes do not pertain precisely to those phenomena.

Nonetheless, the demonstration of area-specific patterns of assault leads one to suspect that there is much to be gained from investigations that directly address the immediate environmental and situational characteristics of assaultive behavior. At the least, this research has demonstrated that assault must be considered in relation to both *characteristics of the offense and attributes of the areas in which these offenses occur.*

APPENDIX A: Source of Data from 17-Cities Survey for the National Commission on the Causes and Prevention of Violence

The data cited from Mulvihill, Tumin, and Curtis, "Crimes of Violence, Volume 11, A Staff Report Submitted to the National Commission on the Causes and Prevention of Violence," 1969, were collected from 17 American cities. These data were part of a study of victim-offender patterns in four major violent crimes (criminal homicide, rape, aggravated assault, and robbery). A 10 percent random sample of offense and arrest reports from the 17 cities covering all regions of the country was taken. The cities studied were Atlanta, Boston, Chicago, Cleveland, Dallas, Denver, Detroit, Los Angeles, Miami, Minneapolis, New Orleans, New York, Philadelphia, St. Louis, San Francisco, Seattle, and Washington, D.C.

APPENDIX B: Social Areas in Westchester County

The definition of the nine social area types discussed in the text and summarized in Table B-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 B-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 B-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 B-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.

All factoring or clustering methods usually begin with a matrix of intercorrelations among the variables

[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 B-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 graduates 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

Table B-1 Continued

Focal Variable	Median	Mean	Standard Deviation	Minimum Value	Maximum Value
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
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.

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 of 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 on 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 intercorrelated variables that represent families headed by females, family income deficiences, 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 household. Medium values on this dimension indicate relatively equal percentages of adult males and percent 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; correspondingly, 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 attribute dimensions:

1) Housing structure/Household size
2) Social problems
3) Male household head/Males over 14
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 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.[5]

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 four dimensions. For example, census tracts that were "high" on all 4 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 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 B-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. This 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 decidedly 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 B-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 very much like those in COUNTRY, which are tracts that are in the relatively more rural portions of the county.

Table B-2 also presents a statistic called the

[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.

[5] The number of combinations mathematically possible is given by the formula $S = C^K$, 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. 154

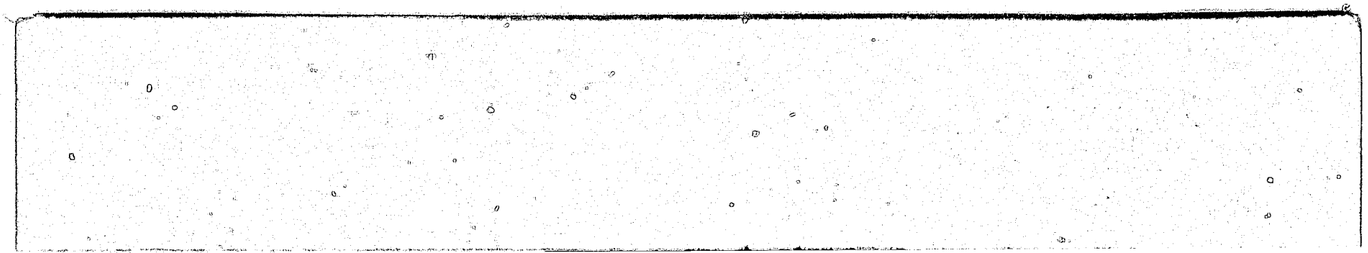
TABLE B-2 Attributes and assault rates of social areas, Westchester County, 1970

Social area type[a]	Number of census tracts	SOCIAL AREA ATTRIBUTE DIMENSIONS[b]: Housing structure (size, price, ownership)/ Household size	Social problems	Male household heads Males over 14	Socio-economic status	Homogeneity across attribute dimensions	ASSAULT RATE OF CENSUS TRACT (per 1,000 persons): Mean	Homogeneity of assault rate[c]
CENTRAL (1)	29	Low	Med	Med	Med	.92	0.7259	.80
ETHMIX (3)	13	Med	Med	Low	Med	.84	0.7457	.78
WORKSUB (4)	54	Med	Med	Med	Med	.93	0.5101	.94
MEDSUBURB (5)	23	Med (High)	Med	Med	High	.94	0.3697	.98
HIPROB (7)	13	Med	High	Low	Low	.87	3.5668	-2.65
MEDPROB (8)	19	Med	High	Med	Low	.90	1.6394	.46
HIWEALTH (9)	11	High	Med (Low)	Med	High	.93	0.5367	.91
COUNTRY (10)	28	High	Med	Med	Med	.93	0.3693	.93
SINGLEMAN (12)	8	High	Med	High	Med	.95	0.1030	.99

[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. 31, 32 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 pp. 33, 35 below for definition and discussion of homogeneity statistic.



"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 B-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 assault rate in each census tract. These data are also shown in Table B-2. For all social area types except HIPROB and MEDPROB, assault rates are relatively homogeneous. The reason that the two areas with high assault rates have low homogeneity of assault rates is that only one or two of all the census tracts in those types have extremely high assault rates.

Finally, it should be pointed out that the assault rate information was helpful in further refinement of the social areas. When the distribution of assault 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 assault 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 assault rate group; CENTRAL, ETHMIX, and HIWEALTH, a group that has moderate assault rates but varies somewhat in social characteristics; and WORKSUB, MEDSUBURB, COUNTRY, and SINGLEMAN, four area types that have low assault rates and are basically working-class or middle-class neighborhoods. The justification used for grouping HIWEALTH with CENTRAL and ETHMIX was in terms of their similarity of assault rates and geographic contiguity. Many of the tracts comprising HIWEALTH were adjacent to the CENTRAL or ETHMIX tracts, and assault rates in those tracts were similar. Therefore, to offset problems of case attenuation in more extensive analyses, those area types were grouped.

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☆ U. S. GOVERNMENT PRINTING OFFICE : 1977 241-093. 2168

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USER EVALUATION QUESTIONNAIRE

Patterns of Assault Characteristics
and Their Occurrence Among Areas
Analytic Report No. 14

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