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Results

The associations between departmental policies on the use of deadly force and the behavior of the departments' officers are shown in Table 1. It is clear that the departmental policy on the use of deadly force was unrelated to the frequency of the use of deadly force by the officers in the department.

Discussion

The conclusions of this paper are in opposition to those of Uelmen. The statistical analysis of the data reported above indicates no association between the departmental policy on the use of deadly force and the officers' use of firearms. The reasons for this may be that the officers in a department fail to perceive and understand the departmental policy, or that they understand the policy but fail to follow it. This latter alternative is plausible since departmental policies are often formulated by a new police chief, and do not reflect a consensus among the police officers in the department. It may also be that the departments do not enforce the policies on the use of deadly force, and so the officers in the departments follow their own guidelines with impunity.

Reference

Uelmen, G. Varieties of police policy: A study of police policies regarding the use of deadly force in Los Angeles County. *Loyola of Los Angeles Law Review*, 1973, *6*, 1–61.

Effects of Police Agency Size on the Use of Police Employees: A Re-examination of Ostrom, Parks, and Whitaker

Robert H. Langworthy *Michael J. Hindelang Criminal Justice Research Center, Albany, New York, U.S.A.*

Abstract

Focusing on the small end of the police agency size continuum, Ostrom, Parks and Whitaker concluded that police agency size is positively related to administrative overhead and functional specialization and negatively related to patrol density. This paper examines these conclusions, shifting the focus to larger agencies. The study uses data presented by Ostrom, Parks and Whitaker and data from the 1977 Kansas City, Missouri Police Department administrative survey of large police agencies. The study concludes that while the relationships isolated at the small end of size continuum they do not appear to hold among large agencies.

Acknowledgement

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The article written by Elinor Ostrom, Roger Parks, and Gordon Whitaker, "Police Agency Size, Some Evidence on its Effects," *Police Studies*, 1978, *1*(1), presents some interesting quantitative findings regarding the effect of agency size on police organization and the delivery of police services. Their study focused on examination of four "assumptions about the role of small departments in service delivery: (1) small departments do not provide a full range of services to the communities they serve; (2) small departments 'waste' personnel by creating the need for separate administrations for each department; (3) small departments predominate in service delivery (especially for patrol); and (4) small departments are less effective than large departments in service delivery" (p. 34). Their analysis provides evidence at odds with these assumptions.

With respect to efficient use of police employees they conclude that "the percentage of officers assigned to patrol decreases as agency size increases. The reverse is true of assignments to administrative services .... Larger departments are more likely to assign personnel to other direct services or auxiliary service tasks" (p. 40). These findings suggest a positive association between both administrative overhead and functional specialization, and police agency size. Their final referent to efficient use of personnel is police patrol density, which they define as citizen-to-patrol officer ratio at 10 P.M. Examining median citizen to patrol officer ratios they note the tendency for larger departments to have higher ratios (less dense patrol) and conclude that the "larger departments are not translating their relative personnel advantage into on-street presence" (p. 40).

This paper examines these efficiency conclusions, but with the focus shifted from the small end of the agency size continuum to the large end to determine whether the conclusions hold among large police agencies. The inquiry is warranted on at least two grounds. First, the agencies in the Ostrom survey at the large end of the size scale were grouped into an over-150-officers category. The large agency category constructed on that basis included agencies ranging in size from about 150 officers to over 2,000, which greatly exceeds the range they examined in their comparison of agencies ranging

in size of from part-time to 150 or larger. While this is not an essential concern where the focus is on the effects of consolidating or collapsing small agencies into large ones, variation of this magnitude in the primary independent variable does seem to warrant examination.

The second reason grows from an acceptance of their position that "while the statement that America is a nation of small police forces is true in terms of the number of police agencies, it is also true that most police officers work in, and most Americans receive services from, moderate- to large-sized police agencies" (p. 55). Moderate to large sized agencies are thus credited with dominance in the provision of American police services, making it all the more appropriate that the effects of size, assumed to be an important structural and service variable, be explored among this class of agencies.

The analysis proceeds in two stages. First, the data presented in the original work are re-examined paying particular attention to the large end of the size scale. These data are then supplemented with measures constructed from the 1977 Kansas City survey data approximating the measures in the Ostrom study. The second stage of the analysis extends the analysis to alternative measures of the focal variables—size, patrol density, and personnel distribution drawn from the Kansas City survey data.

Data and Methods of Analysis

The Kansas City survey data are a product of a cooperative venture by the Kansas City, Missouri, Police Department, the Police Foundation, and the Police Executive Research Forum. The data are the result of a survey of police practices in police agencies that are either members of the Police Executive Research Forum or provide police services to cities with population in excess of 250,000 people. The survey generated descriptive data on 80 of the potential 88 departments. From this survey the present study uses data from 69 municipal police agencies, tapping most of the agencies serving populations of between 250,000 and 1,000,000 (47 of 51 cities of this size), 3 cities over 1,000,000 population, and 19 cities of between 75,000 to 250,000 population.[1]

The survey of police practices provides counts of officers in each agency needed to measure size as Ostrom did. It is not possible to duplicate the measures they used for personnel deployment, or patrol density, but reasonable proxies can be created for both. Personnel deployment data provided in the survey allow classification into patrol personnel, other operations personnel, and administrative or support personnel. These classes of personnel can be created by collapsing the survey personnel categories as follows:

1. Patrol personnel are those assigned to the patrol unit;
2. Other operations personnel are those assigned to traffic, tactical, detective, youth, vice, and other operational units; and
3. Administrative or support personnel are those assigned to technical services, communications, internal affairs, research and development, records, the chief's office, personnel, and other administrative offices.

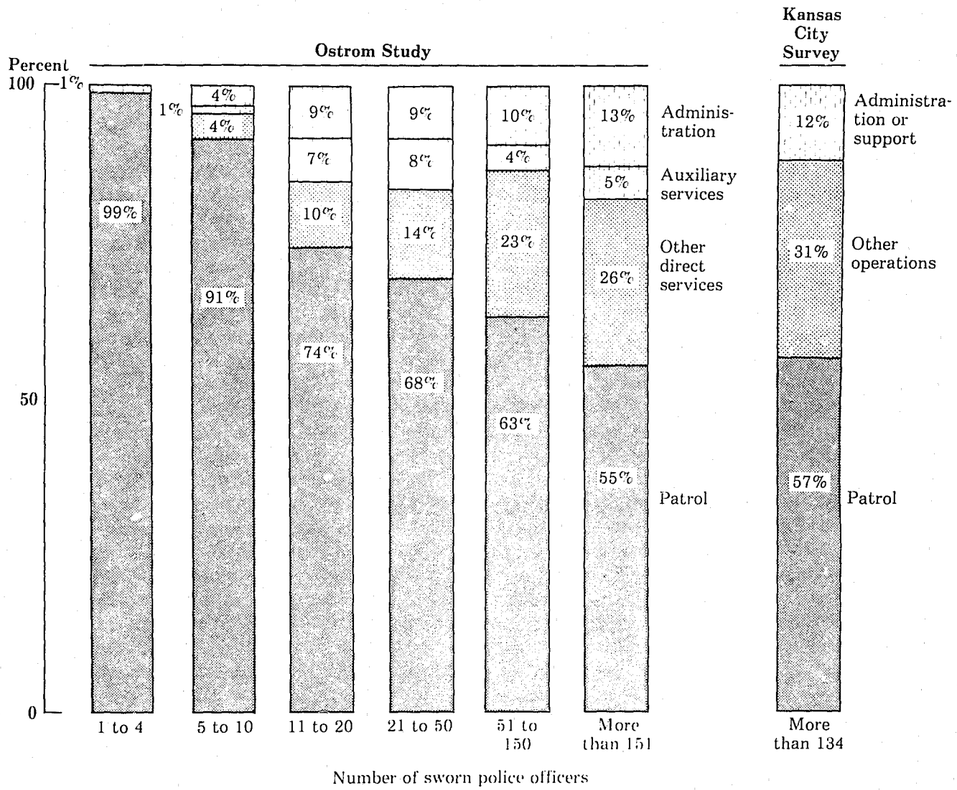
These three categories of personnel compare favorably with Ostrom's 4 categories: patrol, other direct services, auxiliary services, and administration. Patrol density was measured by the Ostrom group as the number of citizens per patrol officer at 10 P.M. The Kansas City survey does not provide this count of officers but does provide the number and type of patrol beats (evening foot and motor, one and two officer). With these data it is possible to determine how many patrol officers are required to staff the beats, thereby providing an estimate of the number of patrol officers at 10 P.M.

The Re-examination

Figure 1 recreates Ostrom's Figure 1 (p. 39) and appends the equivalent Kansas City survey data allowing a comparison of the distribution of police officers across different police agency functions. The similarity in distribution of police officers across the agency functions displayed in both the Ostrom-study large agencies and Kansas City-survey large agencies is very striking. The two data sets indicate virtually identical allotments to patrol in the big department categories. The Kansas City data suggest that slightly more people are devoted to other operations, apparently at the expense of administrative or support units. While this finding suggests that the data sets

Figure 1

Comparison of the Ostrom Study Police Agency and Kansas City Survey Police Agency Distributions of Police Officers Across Agency Functions



Source: Elinor Ostrom, Roger Parks, & Gordon Whitaker, Police agency size: Some evidence on its effects. *Police Studies*, 1978, *1* (1), p. 39. Adapted by author.

were examining the same essential items in the same populations of agencies, it would also appear to support the conclusions developed from the Ostrom study: (1) there is a positive association between agency size and the percentage of police officers assigned to administrative functions; (2) there is a positive association between agency size and the percentage of police officers assigned to other operations; and, (3) there is a negative relationship between agency size and the percentage of police officers assigned to patrol. However, upon close examination it becomes apparent that it is unreasonable to arrive at these size conclusions relying solely on

the graphic which compares incomparable agencies and masks within group variation.

The Ostrom group isolated 4 agency functions (administration, auxiliary services, other direct services, and patrol) and distributed personnel across those four functions in agencies ranging in size from those with less than four personnel to those with more than 150 personnel. Comparisons across that range seem quite unreasonable. Agencies with less than 5 officers are not even capable of providing 24-hour, 7-day-a-week patrol service. The next bar on this graphic, 5 to 10 sworn officers, suggests that, even in the largest agency of this group, 9 officers would be devoted to patrol (barely 2 officers per shift coverage) and one other officer to provide the other three services. The next size group, 11 to 20 officers, staffs each patrol shift with three officers and has one officer left to specialize in each of the other three functions. It is not until we move to the fourth group of police agencies, 21 to 50 police officers, that staffing options truly become available if all functions are staffed by individuals.

Distribution of police officers in the fourth group much more closely approximates that of the larger agencies. The comparison gets even closer when one looks at the provision of direct services. The percentage of police officers devoted to administration and other auxiliary services seems to stabilize at between 14 and 18 percent. Allocation of police officers to units providing direct police services varies from 82 percent to 86 percent and 81 percent in agencies ranging in size from 21 to 50, 51 to 150, and more than 151 police officers respectively. The general decline in percentage of police devoted to patrol seems to indicate losses to other direct police services, not to administrative or support overhead.

Examinations of the Kansas City measures of variation cast even more doubt on the differences of these large and small agency personnel distributions. Table 1 presents measures of dispersion for the Kansas City survey cities. Clearly, the confidence limits bounding each of these functional averages suggests the mean for the group of large agencies is different from the mean for groups of smaller agencies. For patrol, for example, the average proportion of officers assigned to patrol is 57 percent for the Kansas City survey cities. This is very close to the Ostrom average of 55 percent and if we apply the confidence limits developed from the Kansas City data to the Ostrom large departments it is apparent that, as a class, these departments allocate their personnel to patrol differently from the smaller department classes.

Having examined the mean, a measure of central tendency, and variation of the mean, we now turn to an examination of the standard deviation of the distribution of departments in the Kansas City survey. Examination of the standard deviation tells us where we might expect to find members of a class in a similarly drawn sample; this is distinct from the discussion above by its focus on departments instead of on the average, or mean, of a class of departments. In this application we can expect to find 18 percent of the large departments devoting at least 63 percent of their officers to patrol and 8 percent assigning 68 percent to patrol. These departments are devoting the same proportion of officers to patrol as the average of the 51 to 150 and 21 to 50 class police departments.

Similar estimates of variation for the smaller classes of police departments were not derivable from the Kansas City survey data, but it is very likely that some departments in the smaller classes would devote their officers to patrol in the same proportion as the large class. Taking a little more license than has already been taken, if we apply the Kansas City standard deviation for percent devoted to patrol to the 51 to 150 class of agency we can expect 25 percent of the smaller departments to devote a proportion of their officers to patrol similar to, or less than, the average of the over-151-officers department.

To be sure the above analyses take license, but they do suggest the possibility that size may not be determinant in the distribution of

Table 1

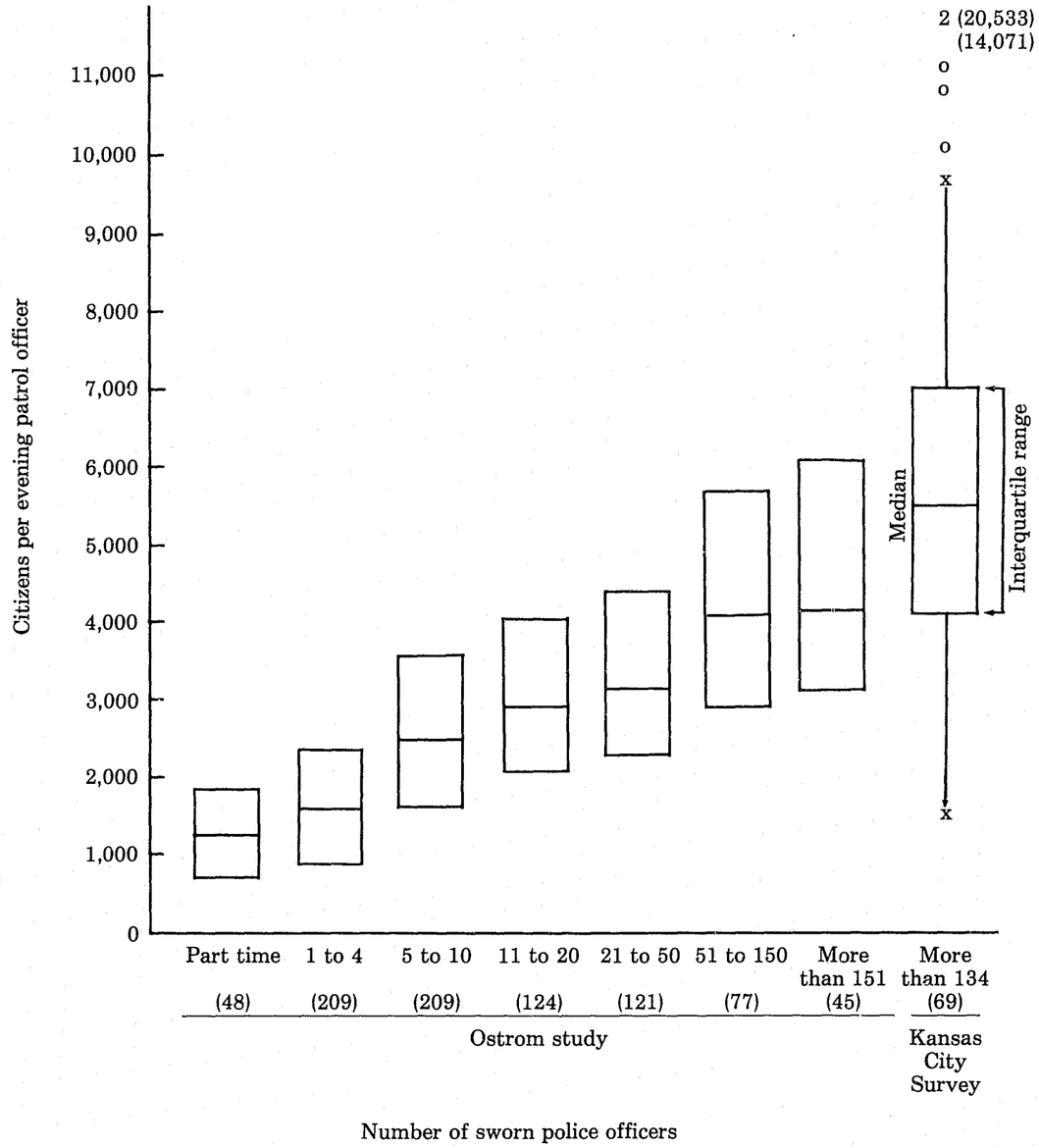
Distribution of Police Officers across Police Agency Functions, Kansas City Survey Cities

[Percent]

Police officers in:	Mean	Standard error	95 Percent confidence interval	Standard deviation
Administration	12.	0.6	11. to 13.	4.3
Other operations	31.	1.1	29. to 33.	8.6
Patrol	57.	1.2	55. to 59.	9.3

Figure 2

Median and Interquartile Range of Citizens Per Evening Patrol Officers, Ostrom Study and Kansas City Survey Police Agencies



personnel to police functions. The best that can be said regarding the effect of size on police agency distribution of police officers is that there is a tendency for larger agencies to devote a lesser percentage of their sworn personnel to patrol, and a tendency for larger police agencies to devote a larger percentage of their police officers to other operations. It should, however, be remembered that tendency is far from compelling. In fact, based on the variability within the large police agencies category, it seems clear that agency size does not command a particular deployment of sworn personnel, but makes deployment options available.

The Ostrom group also conclude that patrol density is inversely associated with the size of the agency. They note that "smaller municipal police departments generally supply a much higher density of patrol than do [larger] municipal departments" (p. 40). They go on to cite median citizen-to-evening-patrol-officer ratios in support of the conclusion.

Figure 2 was developed from the data provided in their Table 2 for municipal police agencies; like Figure 1, it displays the Kansas City data for comparison.[2] Figure 2 displays the median citizen-to-evening-patrol-officer ratio and the interquartile range for police agencies of various sizes. Immediately apparent, and most striking, is the trend toward more citizens per patrol officer as agency size increases, which is precisely the inverse patrol density relationship that the Ostrom group isolated. However, if one takes a closer look at the graphic and focuses on the interquartile range it is apparent that this also increases with agency size. The increasing variation in patrol density as size increases amplifies the preceding conclusion that as size increases so does agency variability. In this particular instance, the median agency patrol density in the 21 to 50 officer agency class is well within the interquartile range of the largest agency class. Here again it appears that while there is a tendency for larger agencies to provide less dense patrol it would not be uncommon for a large agency to provide patrol density like that of smaller agencies.

The Extension

The final portion of the paper extends these analyses to alternative definitions of size and patrol density. The emphasis now shifts from a re-examination of the data developed by the Ostrom group to a look at the Kansas City data and the focus to variation in large agencies.

In defining police agency size, the Ostrom group relied upon the number of police officers. While this may be valid where very small agencies are the focus, failure to include civilian police employees in measuring the size of large agencies needlessly injects potential bias. Many police commentators, Ahern for example, have urged the delegation of support and administrative tasks to civilian employees, thereby freeing officers for street tasks (Ahern, 1973, p. 396). If this recommendation is accepted by some but not all agencies and if examination of administrative overhead is undertaken looking only at the distribution of police officers across agency functions, it is very likely that the administrative support component of agencies with a greater proportion of civilians will be underestimated relative to agencies with a lesser proportion of civilian employees. Couple this with the often suggested intractability of large bureaucratic organizations (Bennis, 1966, p. 9) and it becomes reasonable to suggest the possibility of a size bias resulting from an analytical focus on police officers as the measure of size. For this reason, both the number of police officers and the total number of police employees are used as competing measures of agency size.

As with size, the personnel deployment data focused on police officers and, consistent with the reasoning above, the present analysis will extend the focus to include not only the functional distribution of police officers but also the functional distribution of all police employees.

Table 2 presents correlation coefficients between the two agency size measures and the percent distribution of police employees. These data are presented for the Kansas City survey sample and for a subset of it that excludes the extremely large agencies. Clear from even a cursory examination of these coefficients is the failure of agency size, by either criteria, to be associated in any significant manner with any of the personnel distributions. The only coefficient that achieves any significant size[3] is the coefficient measuring the association between size, as measured by the number of police officers, and the percent of police officers devoted to administrative functions. However, as Figure 3 illustrates, this correlation is largely the

Table 2

Product-Moment Correlations Between Police Agency Size and Distribution of Police Personnel

	All Agencies	Agencies Employing Fewer Than 3,000 Employees	All Agencies	Agencies Employing Fewer Than 3,000 Police Officers
Percent of police officers in:				
Administrative or support units	.16 (61)	.21 (67)	.14 (62)	.30*(59)
Patrol units	.03 (62)	−.02 (58)	.06 (63)	−.07 (60)
Other operations	−.11 (61)	−.08 (57)	−.13 (62)	−.06 (59)
Percent of all police employees in:				
Administrative or support units	−.08 (61)	−.02 (57)	−.12 (61)	−.01 (58)
Patrol units	.18 (62)	.20 (62)	.21 (62)	.17 (59)
Other operations	.11 (61)	.02 (57)	.14 (61)	.02 (58)

The number of cases is noted in parentheses.

*Indicates coefficients that would be considered significant at .05 if they were developed from a properly drawn sample of cities.

product of a single data point, Houston, that has high scores on size and on percent of police officers devoted to administration. With Houston removed from the data set the correlation drops from .30 to .19, which is more like the other coefficients. It seems apparent that, while at the small end of size continuum there may be a relationship between size and personnel deployment, at the larger end the relationship disappears.

Patrol density was measured in the Ostrom study by the ratio of citizens to evening patrol officers. This may be an appropriate measure where small departments without beats are the central concern, or possibly where the interest is on reactive policing where one could consider desirable a low ratio of citizens to officers. However, in large agencies where there are beats, or if the interest in patrol density is directed toward patrol presence, a better measure of patrol density would be citizens per beat or square miles per beat.

The Kansas City survey data make possible more exhaustive examination of patrol density from the beat data they present. In the present study, patrol density is computed as the number of evening foot and motor beats divided by either the population or by square mile area, in addition to the number of citizens per evening patrol officer.

Table 3 presents correlates of the alternative patrol density and size measures. These coefficients offer no support for the Ostrom conclusion regarding the relationship between size and patrol density. The only association to achieve significance suggests that among large police agencies an increase in size is associated with a lower citizen to police officer ratio, that is, patrol density and size vary directly, not inversely as the Ostrom group concluded. Again,

Figure 3

Percent of Police Officers in Administrative or Support Units, by Size of Police Agency, Kansas City Survey Police Agencies

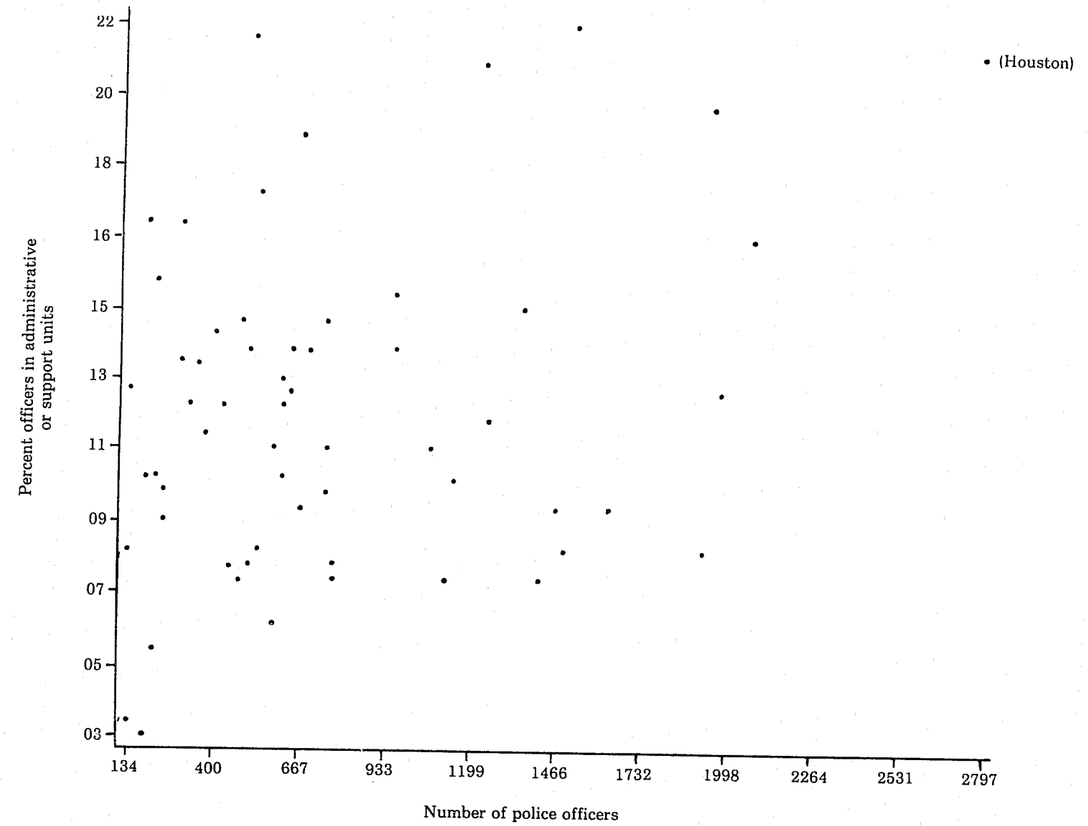


Table 3

Product-Moment Correlations Between Police Agency Size and Patrol Density

	All Agencies	Agencies Less Than 3,000 Employees	All Agencies	Agencies Less Than 3,000 Police Officers
Patrol Density				
Citizens Per Officer	−.22 (55)	−.21 (52)	−.26*(57)	−.18 (55)
Citizens Per Beat	−.08 (55)	−.05 (52)	−.12 (57)	−.04 (54)
Square Miles Per Beat	−.15 (55)	−.03 (52)	−.20 (57)	−.04 (54)

The number of cases is noted in parentheses.

*Indicates coefficients that would be considered significant at .05 if they were developed from a properly drawn sample of cities.

however, it must be stressed that this association is very weak and sufficiently so to be of very little consequence.[4]

Conclusions

The Ostrom study was clearly not focused on the same end of the police agency size spectrum that this study has been. Ostrom, Parks, and Whitaker were concerned with agency consolidation while the focus here has been on the implications of their conclusion for larger police agencies. The data demonstrate that their conclusions, while quite appropriate to the very small agencies, must be qualified when applied to medium and large police agencies. It suggests that agency size does not restrict agency structural options but expands them, and that, though there is certainly a tendency toward decreased patrol density and increased use of police officers in non-patrol capacities, size is not an imperative. The increased variability in agency structure with size clearly suggests an expansion of options. The research task ahead is to gain an understanding of how particular options come to be selected.

Notes

[1] Police Executive Research Forum members are not limited to municipal police but also include county police. As this study is concerned with agencies providing service to municipalities, county police agencies were eliminated from the data set.

[2] The interquartile range of the Kansas City data is similar to that in the Ostrom data but the median is considerably higher. This upward shift in the median may be attributed to the omission of supervisory personnel in calculation of the Kansas City measures.

[3] The idea of significance is confused when applied to these data, since there is no argument posed here suggesting these cities as a sample of anything. Those issues aside, significance at the .05 level is as good an arbitrary criterion as any other. The fact is that an r of .30 is not terribly significant regardless of one's criterion.

[4] In addition to the alternative patrol density measures reported above, measures focused on the day shift were examined. This analysis was undertaken to see if the relationships between size and patrol density changed by time of day. It was suggested that they might be given the possibility of service emphasis differences between suburban "bedroom communities" and metropolitan core cities. The results were virtually identical to the evening shift correlates and are not presented here.

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