POLICE OFFICER HEIGHT AND SELECTED ASPECTS OF PERFORMANCE

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I. INTRODUCTION AND SUMMARY

It has long been the shared belief of the law enforcement community that the height of a police officer has an important effect on the officer's job performance. As a result of this belief, 97 percent of a large sample of the nation's police departments had some minimum height requirement in 1973, with the average minimum requirement being 68 inches.[1]

This well-established law enforcement practice recently has collided with the legal requirements established by equal employment opportunity laws and regulations. The reason for the collision is that minimum height requirements tend to exclude women and persons of certain national origins and races, (e.g., persons of Mexican, Puerto Rican, or Oriental ancestry).

Under guidelines issued by the Department of Justice, it is permissible for a police department to apply minimum height standards only if:

> the recipient of federal funding is able to demonstrate convincingly through the use of supportive data such as professionally validated studies that such minimum height requirements used by the recipient is an operational necessity for designated job categories. . . .[2]

The Justice Department guidelines clarify this standard somewhat by defining "operational necessity" as:

> an employment practice for which there exists an overriding legitimate operational purpose such that the practice is necessary to the safe and efficient exercise of law enforcement duties; is sufficiently compelling to override any discriminatory impact; is effectively carrying out the

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1 Terry Eisenberg, Deborah Ann Kent and Charles R. Wall, Police Personnel Practices in State and Local Governments, International Association of Chiefs of Police et al., Washington, D.C., 1973.

2 Department of Justice, "Equal Rights Guidelines: Minimum Height Requirements--Minorities and Women," 38 Federal Register 473 (Number 46, March 9, 1973).

> operational purpose it is alleged to serve; and for which there are available no acceptable alternate policies or practices which would better accomplish the operational purpose, advance, or accomplish it equally well with a lesser discriminatory impact.[3]

SUMMARY OF PREVIOUS ARGUMENTS

While federal regulations require empirical evidence to support height standards, it is nevertheless desirable to review the reasons given by police for maintaining the height standards which are so widely accepted. If the reasons are sufficiently compelling, then courts might well be persuaded with less rigorous empirical evidence than might otherwise be necessary.

The principal reasons for excluding shorter applicants (typically persons under 68 inches in height) have been stated in numerous ways, but the following statements are believed to be representative:

- Body build is markedly related to strength. . . and strength correlated significantly with height and weight.[4]
- It is apparent that many young adult males find small body size a threat to self-esteem and tend to depreciate their own personal worth based upon this perception.[5]
- Taller officers can see better in crowds and are therefore better able to control public disorders.[6]

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3 Idem.

4 Human Engineering Guide to Equipment Design, edited by Clifford T. Morgan, McGraw-Hill Book Company, New York, 1963, p. 557, as cited by Raymond L. Hoobler and J.A. McQueeney, "A Question of Height," Police Chief, November 1973, p. 48.

5 E.E. Gunderson, Ph.D., "Body Size, Self-Evaluation, and Military Effectiveness," Journal of Personality and Social Psychology, 1965, Vol. 2, No. 6, pp. 902-906, as cited by Hoobler and McQueeney, p. 48.

6 Frank M. Verducci, Ph.D., "Height and Weight Requirements for Police Officers," submitted to the Civil Service Commission, City and County of San Francisco, 1974, p. 15 and p. 40.

For these arguments to be sufficient to bar shorter applicants from police work, some logical links need to be supplied. For example, it might be found that the lesser strength of shorter individuals is reflected in lesser performance. There could be a number of reasons for this: shorter officers might be injured more by people trying to take advantage of them; their partners might be injured more by people trying to take advantage of the team of officers because they seem more vulnerable due to the short officer's size; their lesser height might encourage attacks resulting in injuries to their attackers or to bystanders; or their lesser strength might discourage them from making desirable arrests. It might also be found that the lesser strength of the shorter officers causes them to have weaker egos and to compensate by making more frequent unjustifiable attacks on citizens, or that citizens are more likely to attack shorter officers.

One problem with these often-heard arguments is that the relative importance of physical strength and other desirable characteristics of police officers has not been established. For example, over 95 percent of police deaths in the last decade have been the result of the use of firearms by the assailant. No study has established that physical strength would have been effective in preventing these deaths--although about 15 percent were caused by the assailant using the officer's own gun and might therefore have been prevented by greater alertness or agility. Similarly, more thorough studies might even show whether taller, larger officers present larger targets and are thus more vulnerable to attacks with guns.

It is widely recognized that physical strength is only one of several tools which an officer may use to perform effectively. Knowing the proper procedures to use when arresting a suspect may contribute substantially to officer safety. Knowing how to deal with people, including calming and reassuring them, may reduce the need to resort to physical force. Selecting officers with these traits may be a more effective way of reducing injuries and increasing productivity than may a strict application of standards for physical attributes such as height.

When one discusses the height and race of officers in the same breath, the issue becomes even more complicated. One may ask, for example, whether a tall White officer or a short Puerto Rican officer is safer or more effective in Spanish Harlem in New York City.

In brief, the arguments concerning height and its effect on performance are by no means conclusive. Consequently, it is important to examine empirical evidence in order to determine the effect of height on job performance.

THE PURPOSE OF THIS STUDY

The purpose of this study was to analyze data from several police departments to determine whether the height and performance of police officers were correlated. Early in the study, the difficulty of achieving this objective was realized because police agencies rarely keep data in a form which makes it possible to compare the performance of short and tall officers with similar patrol experience. There is a problem in comparing officers with similar experience because of a national trend of gradually reducing height requirements as a condition for employment. The pattern in the San Diego Police Department--as reported in the Police Chief--is typical:

> The San Diego Police Department lowered its height requirement from 5'9" to 5'7-1/2" in July 1968. . . . On September 15, 1971, the minimum standard was reduced to 5'6-1/2".[7]

Since younger and less experienced officers have less seniority, they often receive the least wanted jobs. These jobs often involve the evening shift (4 p.m. to midnight), weekends, and high-crime sectors. These also are the jobs with the highest risk of injury.[8] Hence, it is not surprising that the strongest determinant of assaults on officers found in this study is the officers' seniority and whether they were assigned to patrol units.[9]

THE DATA COLLECTION PLAN

A telephone survey identified Cincinnati, Ohio; Dade County, Florida; Dallas, Texas; Des Moines, Iowa; New York City; and Oakland, California for inclusion in this study. Representatives from police departments in these cities were invited to a meeting in Washington, D.C. on March 29, 1974. As the result of that meeting, agreement was reached on the data requirements, and a data collection format was designed. Cincinnati dropped out of the study because of the difficulty of assembling the data. New York City was not able to provide the data within the required time limit. For the remaining cities, the data collection plan was adhered to in varying degrees. Nassau

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7 Hoobler and McQueeney, Police Chief, November 1973, p. 42.

8 The Hoobler and McQueeney study shows that over 57 percent of assaults on police officers occurred on Saturday or Sunday and 55 percent of assaults occurred between 4:00 p.m. and midnight (p. 46).

9 See analysis of data from Dallas, p. 13, below.

County, New York was later added to the study; however, it was not able to comply fully with the study's specifications.

The data format (see Appendix B) would have permitted an examination of the relationship between an officer's height and each of the following variables:

- education
- civil service score
- police academy score
- felony arrests
- moving traffic citations given
- non-felony arrests
- department commendations
- department complaints
- sustained citizen complaints
- days of paid sick leave
- days of paid injury leave
- days on light duty
- days suspended/forfeited pay
- times assaulted
- times in auto accident
- times injured on duty.

Additional data were requested concerning the type of activity in which an assaulted officer was involved, weapons which may have been used, descriptions of assailants, and the effect of the assault on the officer.

Data collection was divided into two phases in order to reduce the demands on the participating departments. The first phase was the preparation of a table by each department showing: (1) the distribution of heights of officers assigned to patrol, and (2) the distribution of heights of officers who recently were assaulted. The definition of "assault" varied somewhat depending on the type of data available in each department. It was intended, however, that Phase Two data collection

(see Appendix B) would occur only if Phase One differences were statistically significant. The purpose of Phase Two data was to provide an in-depth analysis of reasons for differences due to height.

DESCRIPTION OF DATA THAT WERE COLLECTED

The only department which adhered to the phased data collection effort was Des Moines. Their data showed that there was no statistically significant relationship between height and assaults. Consequently, Phase Two data were not requested from Des Moines.

Dallas, Dade County, Nassau County and Oakland all provided Phase Two data, which are analyzed in this report.

Table 1 summarizes the types of data collected by each participating department for this study, and it also indicates the statistically significant differences found in the data that were provided.

CONCLUSIONS

Police agencies studied have kept their personnel data in various formats which do not permit them to make comparisons of the performance of different groups of officers. This is an indication that police departments in general are unable at this time to assemble data on tall and short officers with comparable field experience and seniority.

In addition, data used in this study relate almost exclusively to males 67 inches and taller. The shortest officer in the Nassau County example was 68 inches and fewer than ten percent of the sample of Dallas officers were shorter than 68 inches.

The inadequacy of these data makes it difficult to address directly the relationship between height and performance of police officers. However, neither the empirical study nor the review of literature discovered any data showing an important difference in the performance of tall and short officers with similar seniority and assignments. Data from Oakland indicate that shorter officers are more likely to have less seniority and have more negative encounters with citizens--but without further data collection the relative contribution of height and seniority cannot be estimated.

Findings from two departments for which a key variable, officer experience, was controlled (Nassau County and Dallas) show that height differences have, with one exception, no statistically significant effect on performance:

- No statistically significant relationship with height was found in either department for assaults on officers, auto accidents, department complaints, injuries on duty, or department commendations.

Table 1

SUMMARY OF TYPES OF DATA COLLECTED FOR THIS STUDY AND OF STATISTICAL SIGNIFICANCE OF HEIGHT COMPARISONS

		Availability of Data (yes,) and Summary of Relationships Involving Height (Statistically Significant = *; Not Significant = NS; Blanks indicate that the item is not applicable, the sample is too small or there are no data available.)				
		Dallas, Texas	Dade Co., Florida	Nassau Co., New York	Oakland California	Des Moines, Iowa
	Height	Yes	Yes	Yes	Yes	Yes
BACKGROUND DATA	Age	Yes NS				
	Seniority	Yes NS			Yes *[h]	
	Weight	Yes				
	Sex	Yes				
	Ethnicity	Yes				
	Education	Yes NS				
	Test Scores	Yes NS				
ACTIVITY AND PERFORMANCE DATA	Remained/Left Department	Yes				
	Arrests, Traffic Citations					
	Commendation	Yes NS		Yes NS		
	Complaints	Yes NS		Yes *[g]		
	Sick Leave	Yes NS				
	Injuries	Yes NS		Yes NS	Yes	
	Light Duty					
	Suspended/Pay Forfeited					
	Auto Accidents	Yes NS		Yes NS	Yes	
	Assignment Type	Yes NS	Yes *[d]			
	Assaults, Frequency	Yes NS	Yes NS	Yes NS	Yes *[i]	Yes NS
	Conditions	Yes *[a]	Yes *[e]			
	Weapon(s)	Yes NS	Yes NS			
	Assailant(s)	Yes *[b]	Yes *[f]			
	Outcome	Yes *[c]	Yes NS		Yes *[j]	

a. See Table 23. (Assaults on officers who were at least 5 feet 10 inches tall were more likely to occur while responding to a disturbance or attempting an arrest, and assaults on shorter officers were more likely while they were handling prisoners, conducting traffic stops or engaged in other activities.)

b. See Table 24. (Assaults on officers who were at least 6 feet tall were more likely to be made by normal citizens--not intoxicated by liquor or drugs or mentally impaired--than were assaults on shorter officers. The opposite trend is noted in footnote f below.)

c. See Table 25. (Officers who were 5 feet 9 inches or shorter were more frequently the only officers injured and taller officers were more likely to be injured together with a partner.)

d. See Table 40. (Lieutenants were taller than sergeants and sergeants taller than other officers.)

e. See Table 48. (Assaults on officers who were 5 feet 9 inches or shorter were more likely to occur when no other officer was present than were assaults on taller officers.)

f. See Table 46. (Assaults on officers who were at least 6 feet 4 inches tall were less likely to be made by normal citizens--not intoxicated by liquor or drugs or mentally impaired--than were assaults on other officers. This is the opposite finding from footnote b, above.)

g. See Table 34. (Officers who were 5 feet 9 inches or shorter were far more likely to have sustained citizen complaints than were taller officers.)

h. See Figure 3 and Table 52. (During the sample period, taller officers worked more man-months-i.e., were more likely to be in the department during the entire sample period--and had fewer encounters--negative interactions with citizens--per month worked.)

i. See Figure 3 and Table 52.

j. See Table 54. (Officers 5 feet 11 inches or shorter were somewhat more likely to be injured during an encounter with a citizen than were taller officers.)

- No statistically significant relationship with height was found for sick leave in Dallas, the only department providing these data.

- A statistically significant relationship with height was found for sustained citizen complaints in Nassau County only (one complaint for every 16 man-years worked by officers who were 69 inches or shorter, compared to one complaint for every 73 man-years worked by taller officers).

The Dallas data also support two interesting observations.

- Officers who were more frequently assaulted also had more auto accidents, commendations, complaints, injuries, and paid sick leave. This finding suggests an "active" profile for assaulted individuals, which may be related to high productivity. (Data on productivity were not collected.)

- The cost to the department from paid injury leave for officers was minimal, amounting to an average of about 0.08 man-days per man-year worked. This finding tends to de-emphasize the importance of costs in discussions of assaults and officer height.

For the sites studied here, more control of the data was possible than in previously reported work, allowing the results to be viewed with more confidence. However, experienced officers who are shorter than 67 inches are not frequently enough engaged in police patrol work to permit empirical evaluation of their performance.

The results reported here--when considered together with arguments and findings from other research, including professional and legal sources--have the following operational implications:

- Federal regulations require that shorter applicants not be excluded from employment as patrol officers unless professionally validated studies demonstrate an operational necessity. This study found no such data.

- Height requirements can vastly reduce the pool of applicants who have personal qualities needed by police departments. For example, fifty-six percent of young adult males and 99 percent of young adult females would be excluded from employment[10] by a minimum height requirement of 5 feet 9 inches.

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10 See Table C-13, Appendix C.

- Police departments will never know whether shorter officers perform differently than their taller counterparts unless shorter officers are hired as patrol officers and are carefully compared with a properly selected group of taller, "comparison" officers.

- There are no data which document that there is any difference in performance between short and tall officers who have similar seniority and are given similar assignments.

RECOMMENDATIONS

The following recommendations may assist police departments to comply with legal requirements and, simultaneously, to increase their effectiveness:

- Eliminate the height requirement and use a selection system based on the overall potential of the applicant for successful police work. This would prepare the way for a future evaluation that would resolve the issue of height.

- Provide training for officers addressed to skill development in areas thought by police professionals to involve a height-performance relationship.

SUMMARY OF FINDINGS

A brief overview of the specific findings are shown in Table 1; a more detailed description of the findings from each department in the survey is presented below.

Dallas

Two samples, one consisting of 144 officers and the other consisting of 181 assaults on officers, were submitted for analysis. The data covered roughly thirteen calendar months.

In the first stage of the analysis, officers of different heights were studied to determine whether their background characteristics or assignments varied with their height. If height was correlated with background characteristics, then it might have been difficult to determine whether to attribute performance differences to height or to the correlated characteristic. However, the distribution of officers' heights was similar for various levels of seniority, assignments and background characteristics. Hence, the data were determined to be acceptable for the study of performance.

Next, officers of different heights were compared on the following performance measures:

- assaults on officers
- auto accidents
- sick leave
- on-duty injuries
- department commendations, and
- department complaints.

No statistically significant relationship (at the .10 level of significance) was found between height and any of these performance measures. Hence, it was concluded that height and performance were not correlated in Dallas. (Data on arrests by officers were not available.)

Data were then examined to determine whether factors other than height had a more powerful influence on the likelihood of an assault on an officer than did height. The strongest determinants of assaults were:

- the assignment of an officer (either to a patrol or to a non-patrol unit) and
- the seniority of the officer.

Patrol officers' exposure to assults was influenced by the type of activity in which they were engaged. For example, 64 percent of assaults on officers occurred when they were responding to a disturbance or were attempting an arrest. Senior officers may have had assignments which less frequently exposed them to the risk of assault, and they may have acquired skills which reduced their exposure to assaults by increasing their ability to deal with potentially violent situations.

Next the data were analyzed to determine the characteristics of officers who were most frequently assaulted. Generally, it was found that they were more active. Assaulted officers were:

- more frequently involved in auto accidents
- more frequent recipients of department commendations
- more frequent recipients of department complaints
- more frequently injured, and
- more frequently placed on paid sick leave.

All of these trends were statistically significant at the .01 level. From some police viewpoints, this picture of assaulted officers would suggest that they were the kinds of officers who might be sought for policing. From that viewpoint, the frequency of assaults on officers ought to be rejected as a criterion for determining whether short or tall officers should be hired for patrol.

In the next analysis, seventeen aspects of the assaults were examined to determine whether officers' heights were related to the type of assault in which they became involved. By chance alone it would be expected that between one and two of these comparisons would be statistically significant. (These tests indicate whether each of the 17 variables would be related to height.)[11]

Three aspects of assaults were found to be significantly related to an officer's height. It was found that:

- a higher proportion of the assaults on taller officers occurred when they were responding to a disturbance or attempting an arrest; and a higher proportion of assaults on shorter officers occurred during other activities, such as traffic stops or handling prisoners;

- assailants of taller officers were less likely to be intoxicated than were assailants of shorter officers; and

- taller officers were more likely to be injured from an assault when they were together with another officer than were shorter officers.

It is not at all clear what caused these relationships. One might hypothesize that the first relationship occurred because taller officers were assaulted only in relatively tough situations and that shorter officers were assaulted in more ordinary situations. But, then why was an intoxicated assailant less likely to attack a tall officer? Why were taller officers assaulted more frequently when there was other backup present?.

Furthermore, most aspects of assault were not found to be correlated with an officer's height. These aspects included: use of a weapon, officer's duty status (in uniform or not), sex of assailant, race of assailant, age of assailant, number of assailants, whether the assailant was known by the officer prior to the assault, the direction from which the officer was assaulted, whether the attack was by a sniper or was some

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[11] The chance that at least one of the 17 tests would be significant at the .1 level is $1-(.9)^{17}= .83$.

form of ambush, the type of weapon used by the assailant, whether the officer was injured, whether the officer missed work, and whether the officer was assigned to light duty.

The Dallas data indicated that the cost of assaults to the police department was minimal. On average, an officer took two man-hours of paid injury leave per year due to injuries from assaults. During the 13-month sample period there were 182 assaults for an agency with 750 officers or 0.22 assaults per man-year. Ten percent of the injured officers missed some workdays, with these officers averaging an estimated six workdays lost. The net result was a loss of 0.08 days of paid injury leave per man-year.

Nassau County

The Nassau County Police Department provided summaries of data on two samples of officers from patrol precincts, consisting of 223 officers who were assaulted and 251 officers who were not assaulted. The data submitted for analysis did not contain information on the seniority of the officers or the shifts to which they were assigned--preventing the researchers from conducting a preliminary analysis to determine whether officers' heights were correlated with some other background characteristics.

Data were analyzed to determine whether an officer's height was related to:

- assaults,
- accidents in department vehicles,
- sustained citizen complaints,
- injuries on duty, and
- department commendations.

The only statistically significant relationship between height and these measures was that shorter officers received slightly more citizen complaints (one per 16 man years among the officers who were 69 inches or shorter and one per 73 man years for the taller officers).

Other Participating Departments

Des Moines, Iowa; Dade County, Florida; and Oakland, California also participated in this study.

Since Des Moines adhered to the original data collection scheme and provided information limited to the height of 181 assaulted or injured officers and on 181 non-assaulted officers, only a Phase One analysis of

this data was conducted. It was determined that an officer's height was not significantly related to the likelihood of an assault or injury. Consequently, no further data were requested from the department.

Dade County provided data on 869 officers and on 249 incidents in which officers were assaulted. It was found that height was not significantly related to assaults. Further, it was found that sergeants and lieutenants, separately identified in this data, were more likely than non-ranked officers to be taller than 69 inches and that they had a much lower assault rate. Clearly, these data cast serious doubt on conclusions which might be drawn from data about height which does not distinguish between ranked and unranked officers, in departments where ranked officers are apt to be taller. (Ranked officers would tend to have more seniority than unranked officers.)

In examining the characteristics of assaults in Dade County, two statistically significant relationships were found:

- assailants of taller officers were more likely to be intoxicated than were assailants of shorter officers; and

- assaults on shorter officers were more likely to occur when no other officer was present than were assaults on taller officers.

The first relationship was opposite to the relationship found in Dallas, and the second relationship was similar to the Dallas finding that injuries to shorter officers were more likely to occur when no other officer was injured. All other relationships between heights of officers and characteristics of assaults were found not to be statistically significant. These non-significant relationships included: assailant's age, race or sex; the number of assailants and whether they used a weapon; whether the identity of the assailant was known by the officer prior to the assault; whether the officer used a weapon or was injured; the kind of activity in which the officer was involved; and whether injuries were sustained by more people than just the officer who was assaulted.

Data submitted by Oakland had the largest sample sizes of any jurisdiction in this study, but the data presented serious problems because Oakland recently had reduced its minimum height requirements, and short officers in this sample had less experience than their taller counterparts. Controlling for experience is necessary for two reasons. First, experience may be related to assignment; officers may be assigned to riskier duties in ways that vary systematically with experience which in turn is related to height. Second, experience may be related to the style of an officer's performance. Less experienced officers may be either more or less cautious, or provocative in their approach to potential assault situations.

The Oakland data consisted of 12,437 "negative encounters" with citizens (i.e., situations involving a charge of resisting arrest, an assault on an officer or other situations considered to be similar), 8,605 officer injuries, 853 citizen injuries and 682 vehicular accidents. The data showed that shorter officers (with less seniority and, perhaps, different assignments) had a higher number of negative encounters per man-year. The meaning of this relationshp cannot be adequately understood, however, until data are collected on whether the officers were assigned to patrol and on what shifts they may have worked.[12]

SUMMARY OF LITERATURE REVIEW

A review of research studies dealing with officers' height was conducted. Reviews of individual studies and an analysis of some of the previously reported data are presented in Appendix C. For the purpose of discussion, these studies and sets of data may be divided into two groups: (a) studies which support the position that there are no adequate data indicating that tall and short officers perform differently, and (b) studies (and sets of data) which indicate some performance advantage for tall officers but which, universally, are based on inadequately controlled data or on faulty analysis.

Studies Indicating Lack of a Difference Due to Height

Atlanta, Georgia conducted a study of 300 officers, all of whom were listed on the "watch-duty roster" and who presumably performed patrol duty. Analysis of the Atlanta data indicates that there was no difference in the likelihood that taller or shorter officers would be assaulted or injured.

Southern Methodist University Law School conducted a study of 17 assaults in a sample of 100 officers in Dallas, Texas. Given the small sample size, it is not surprising that height and assaults were not correlated in a statistically significant way.

Frank Verducci conducted a literature review in which he did not perform any new quantitative analysis. He concluded that there was no definitive study relating height to performance, and he recommended that

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12 In a further analysis of the Oakland data, it was determined that shorter officers had slightly fewer injuries per negative encounter. This relationship was interesting because the number of negative encounters might indicate, in part, the amount of risk to which an officer was exposed during his patrol work. However, this relationship was not quite statistically significant at the .10 level.

a study be conducted. In a similar vein, Sam Chapman surveyed 1,143 assault incidents (most of the data came from cities in Oklahoma); but he realized that in the absence of a control group he was unable to draw any conclusions about the assault-height relationship.

Studies Indicating a Difference Due to Height

The most widely circulated study in support of the height-performance relationship was the Hoobler and McQueeney study, published in Police Chief. That study of the San Diego Police Department found no statistically significant relationship between officers' heights, the number of arrests they made, the frequency with which they were assaulted or their use of sick leave. However, significant relationships were reported to exist between an officer's height and: (1) citizen complaints, (2) officer injuries, and (3) accidents with police equipment. Officers who were 68 inches or shorter were most likely to be subject to these three types of occurrences.

In analyzing injuries to officers, Hoobler and McQueeney stressed the number of officers who were injured. However, their data when reanalyzed[13] show that there was no difference between tall and short officers in the number of injuries per officer. The reason for this apparent contradiction in the data (which depends on which alternative method of data analysis is used) is that the taller officers were less likely to be injured, but there were more injuries per officer for the officers who were injured. Arguably, injuries per officer is the better measure of the cost of injuries to the department, and Hoobler and McQueeney would have done better to stress that measure of cost.

Hence, most of the Hoobler and McQueeney data show similarities between short and tall officers. The differences boil down to the frequency of citizen complaints and the frequency of accidents with police equipment. It is not clear why shorter officers should be deficient in these respects. The San Diego data are not subject to the objection of lack of control of reassignment to different shifts. Data presented in Chart 2 of the study show that officers who were 68 inches or shorter had very similar assignments to offices who were taller (chi-square = .72). No information is available from the study about the height of officers assigned to riskier areas of the city or to the riskier shifts.

In addition to the Hoobler and McQueeney study, there was an Evansville, Indiana study which concluded that shorter officers performed less well than their taller counterparts. That study found that

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13 See p. 99-104.

shorter officers were more subject to physical abuse complaints--to substantiated or unsubstantiated verbal abuse complaints and to injuries. Statistical analysis of the Evansville data corroborated the latter two statistical relationships and cast some doubt on the first relationship, which barely missed statistical significance at the 0.1 level. The principal defect in this study is its lack of adequate background information on the officers--a serious problem because all the officers who were shorter than 69 inches were hired after 1965 (when the minimum height requirements was reduced). In addition, the study did not present any data on the number of arrests made or the number of commendations received by officers in the sample; and the Dallas data suggest that the officers who are most complained against may also be the most active and most frequently commended.

A study by the Portland, Oregon, Bureau of Police concluded that shorter officers were more likely to be assaulted than were taller officers. Reanalysis of the data in that report indicated that there were important flaws in the statistical analysis (see pages 104-108). In addition, the Portland report failed to indicate whether officers had less seniority than taller officers.

In this review of the literature, commonly cited data from four cities (see page 112) had been cited and analyzed. While the relationships between height and performance measures in these data consistently favor the taller officers, none of these data sets indicates the seniority or assignments for officers of different heights. Nor do any of the data show any positive performance data, such as numbers of arrests or numbers of commendations.

In light of general trends in other departments, it seems likely that the shorter officers may have less seniority and may be exposed to greater patrol risks. Despite the statistical significance of these data, this lack of adequate controls for seniority and exposure to risk deprives this data of its possible usefulness. Furthermore, the trend in Dallas indicates that officers who are injured more may also be generally more active, receiving more commendations as well as more complaints. The absence of positive indicators of performance also helps to deprive the negative indicators of some of their usefulness.

If seniority and assignment information and other performance measures (including commendations and numbers of arrests) can be added to these data, the usefulness of the data might be vastly increased.

II. DALLAS

Data collected for this study by the Dallas Police Department were the most useful for this study because they conformed most closely to the original data collection plan. The sample period covered May 5, 1973 to June 15, 1974 and included two separate samples. First, there was a random sample of 144 officers in the department during the sample period. Second, there was a sample of officers who were involved in the 182 assaults that occurred during the sample period. Because the officer's height was not recorded for seven officers in the random sample and one officer involved in an assault, the analysis was limited to 137 officers and 181 assaults.

The Dallas data indicated that there was no statistically significant relationship between height and six performance measures. The six performance measures were: assaults, auto accidents, sick leave days, on-duty injuries, department commendations, and department complaints. The Dallas department did not provide data on arrests made by officers because the effort of assembling the data would have been too extensive.

In Dallas, officers who were 5 feet 9 inches and shorter were assaulted at a slightly lower rate than taller officers, but the trend was not statistically significant. The distribution of assaults for officers of different heights is shown in Table 2. Figure 1 shows what would have happened to the assault rate during the data collection period if shorter officers (and the assaults against them) were excluded from the samples. The solid curve in Figure 1 has been computed directly from Table 2. The dotted curves indicate that the apparent advantage from hiring shorter officers may be considered a random effect, within statistical standards established for this study. For example, the 80 percent lines indicate that if one were to draw another set of samples from a single group (universe) of officers among whom there were no overall differences due to height, the chances would be 80 out of 100 that the entire solid curve would fall within the dotted lines.

BACKGROUND OF OFFICERS OF DIFFERENT HEIGHTS

None of the background characteristics of the random sample of officers was found to be significantly related (at the 0.10 level) to officer's height (see Table 3). The civil service score was so frequently omitted from the data that this report is inclined to disregard the finding--from the available data--that taller officers had significantly higher civil service scores.

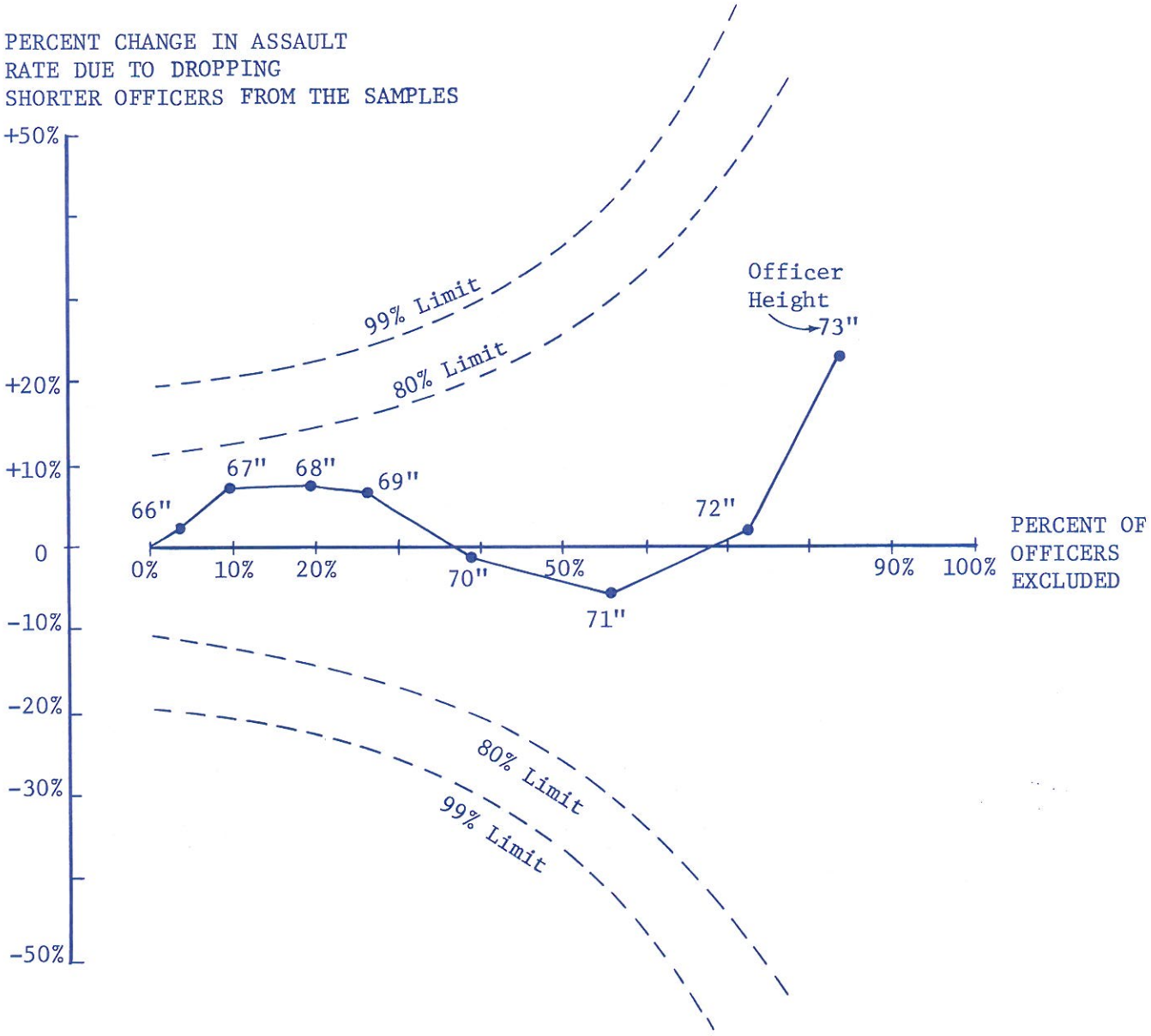
Table 2

HEIGHT OF OFFICERS IN DALLAS FOR RANDOM SAMPLE OF OFFICERS AND NUMBER OF ASSAULTS

HEIGHT (Inches)	NUMBER IN SAMPLES		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	All Officers	Assaulted Officers	All Officers	Assaulted Officers	
66 or less	5	2	3.6	1.1	2.5
67	8	4	9.5	3.3	6.2[a]
68	13	18	19.0	13.2	5.8
69	10	15	26.2	21.5	4.7
70	17	33	38.6	39.7	-1.1
71	24	34	56.1	58.5	-2.4
72	23	25	72.9	72.3	0.6
73	15	14	83.8	80.0	3.8
74	13	20	93.3	91.1	2.2
75	8	5	99.1	93.8	5.3
76 or more	1	11	100.0	100.0	0.0
Total (known)	137	181			

NOTE: Data are from May 1973 to June 1974.

[a] This is the greatest difference in the cumulative percents of the number of officers and of assaults. The difference is not statistically significant even at the 0.20 level of significance.



NOTE: Sample from entire department = 137 officers; sample from all assaults = 181 assaults. The 80 percent and 99 percent limits indicate the range in which the unbroken curve might vary under the condition that the only source of variation was sampling error and not any systematic height trend. Namely, if one were to draw another set of samples from a single source of heights, then the chances are 99 in 100 that the entire solid curve would stay within the 99 percent limits as indicated by the two dashed curves. The derivation of the limit curves is given in Appendix A.

Figure 1

CHANGE IN ASSAULT RATE IF SHORTER OFFICERS
ARE DROPPED FROM THE DALLAS SAMPLE

Table 3

SUMMARY OF BACKGROUND CHARACTERISTICS
AND THEIR RELATIONSHIP TO HEIGHT

BACKGROUND CHARACTERISTIC OF OFFICER	IS THERE A STATISTICALLY SIGNIFICANT[a] RELATIONSHIP BETWEEN AN OFFICER'S HEIGHT AND BACKGROUND CHARACTERISTICS?
Year of Birth	No
Year Joined Department	No
Education	No
Police Academy Score	No
Assignment	No
Civil Service Score	[b]

[a] At the 0.10 level.

[b] Too much missing data; however, based upon the 65 (out of a total of 137) officers with available data, the answer would be yes. Taller officers had higher scores.

Since the seniority and the assignments of officers in Dallas have a strong influence on assault rates, the finding that officers of different heights did not differ on these variables was very important. For example, the assault rates among less senior officers on patrol assignments was 226 percent of the overall assault rate among all officers (see Table 4).

Table 4

ASSAULT RATES IN DALLAS FOR LESS SENIOR AND MORE SENIOR OFFICERS ASSIGNED TO PATROL AND OTHER DUTIES

DATE THE OFFICER JOINED THE DEPARTMENT (Seniority)	ASSAULT RATES (AS A PERCENT OF THE DEPARTMENT'S AVERAGE ASSAULT RATE) FOR OFFICERS, BY CURRENT ASSIGNMENT	
	Patrol (%)	Other (%)
After 1968	226[a]	66[b]
1968 or earlier	69[c]	46[d]

NOTE: Sample size = 136 randomly selected officers and 181 assaulted officers.

a This category contains 25 percent of the random sample of officers and 56 percent of the sample of officers who were assaulted.

b This category contains 24 percent of the random sample of officers and 15 percent of the sample of officers who were assaulted.

c This category contains 19 percent of the random sample of officers and 13 percent of the sample of officers who were assaulted.

d This category contains 32 percent of the random sample of officers and 15 percent of the sample of officers who were assaulted.

Height of Officers

At the time of the survey, a majority of the officers in the random sample of officers were under 35 years old. The distribution of years of birth for officers of various heights is shown in Table 5.

Table 5

YEAR OF BIRTH FOR OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY YEAR OF BIRTH							
	1939 and earlier		1940-1949		1950 and later		Total	
	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	26	9	63	22	11	4	100	35
70 -72	37	23	49	31	14	9	100	63
73 and above	41	15	51	19	8	3	100	37
All heights	35	47	53	72	12	16	100	135[a]

NOTES: Data are from May 1973 to June 1974.

Chi-square = 2.81 with 4 degrees of freedom, probability = 0.59

[a] Excludes two officers whose dates of birth were missing.

Experience in the Department

Fifty-eight percent of the officers in the random sample had five or more years experience in the department. The taller officers had slightly more work experience than did the shorter officers, but the difference was not statistically significant at the 0.10 level (see Table 6).

Table 6

YEAR OF JOINING THE DEPARTMENT FOR OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY YEAR JOINED DEPARTMENT							
	1964 and earlier		1965-1969		1970 and later		Total	
	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	28	10	14	5	58	21	100	36
70 -72	29	18	33	21	38	24	100	63
73 and above	41	15	24	9	35	13	100	37
All heights	32	43	26	35	42	58	100	136[a]

NOTE: Data are from May 1973 to June 1974.

[a] Excludes one officer whose date of joining the department was missing.

CONCLUSION: As a group, the shorter officers tend to have had fewer years of experience in the department; however, the differences were not statistically significant (chi-square = 7.56, probability = 0.11).

Education

The sample was about evenly split between officers with up to 12 years of education and officers with at least some additional education. Officers of different heights had similar educational backgrounds (see Table 7).

Table 7

EDUCATION FOR OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY YEARS OF EDUCATION					
	12 years or less		Over 12 years		Total	
	(%)	(N)	(%)	(N)	(%)	(N)
69 and less	56	20	44	16	100	36
70 -72	48	28	52	30	100	58
73 and above	53	19	47	17	100	36
All heights	52	67	48	63	100	130[a]

NOTE: Data are from May 1973 to June 1974.

[a] Excludes seven officers whose years of education were missing.

CONCLUSION: There was no statistically significant relationship between height and education (chi-square = 0.68, probability = 0.70).

Police Academy Scores

Police academy scores were not reported for 43 of the 137 officers in the random sample of officers. There was no statistically significant relationship between the heights and academy scores of officers whose scores were reported (see Table 8).

Table 8

POLICE ACADEMY SCORES FOR OFFICERS
OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY POLICE ACADEMY SCORES					
	89 or lower		90 or above		Total	
	(%)	(N)	(%)	(N)	(%)	(N)
69 and below	62	16	38	10	100	26
70 -72	52	23	48	21	100	44
73 and above	46	11	54	13	100	24
All heights	53	50	47	44	100	94[a]

[a] Excludes 43 officers whose police academy scores were missing.

CONCLUSION: There was no statistically significant relationship between height and police academy scores (chi-square = 1.26, probability = 0.53).

Assignments

Since the data collection form anticipated that results would be obtained only for patrol officers, there was no blank on the form to indicate an officer's assignment. However, Dallas reported information on some officers who did not have patrol assignments, and it indicated the assignment by writing it in on each of the forms. Using this handwritten data, we determined that officers of different heights had similar assignments (see Table 9).

Table 9

ASSIGNMENTS FOR OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY ASSIGNMENT							
	Patrol		Special Operations CID, Vice, Drugs		All Other		Total	
	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	39	14	28	10	33	12	100	36
70 - 72	44	28	31	20	25	16	100	64
73 and above	46	17	32	12	22	8	100	37
All heights	43	59	31	42	26	36	100	137

CONCLUSION: There was no statistically significant relationship between height and assignment (chi-square = 1.39, probability = .86).

Civil Service Scores

Civil service scores were not reported for 72 of the 137 officers in the sample. Among the 65 officers with reported scores, there was a tendency for the taller officers to have had higher scores. The difference was statistically significant at the 0.10 level, but the large number of missing observations makes it difficult to interpret this statistical relationship (see Table 10).

Table 10

CIVIL SERVICE SCORES FOR OFFICERS
OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY CIVIL SERVICE SCORE					
	79 or lower		80 or above		Total	
	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	75	12	25	4	100	16
70 -72	48	13	52	14	100	27
73 and above	36	8	64	14	100	22
All heights	51	33	49	32	100	65[a]

[a] Excludes 72 officers whose civil service scores were missing.

CONCLUSION: Among those officers with reported scores, shorter officers had lower scores (chi-square = 5.67, probability = 0.06). The difference is statistically significant at the 0.10 level; however, the large number of officers with missing data is a good reason for viewing the result cautiously.

PERFORMANCE OF OFFICERS OF DIFFERENT HEIGHTS

The performance of the sample of officers was not found to be related to their height in a statistically significant way (see Table 11). The performance characteristics include: auto accidents, sick leave days, on-duty injuries, department commendations, department complaints and assaults. No data were available on arrests.

Table 11

SUMMARY OF PEFORMANCE CHARACTERISTICS AND THEIR RELATIONSHIP TO OFFICERS' HEIGHTS IN DALLAS

CHARACTERISTIC OF OFFICER	IS THERE A STATISTICALLY SIGNIFICANT[a] RELATIONSHIP BETWEEN THE OFFICERS' HEIGHTS AND PERFORMANCE CHARACTERISTICS?
Frequency of Auto Accidents	No
Sick Leave Days	No
Frequency of On-Duty Injury	No
Department Commendations	No
Department Complaints	No
Frequency of Assaults	No

NOTE: Data are from May 5, 1973 to June 15, 1974.

[a] At the 0.10 level of significance.

Assaults: Controlling for Seniority and Assignments

Because seniority and assignments were found to have a strong influence on assault rates (see Table 4, page 21), an examination was conducted on the influence of height on assaults when seniority and assignments are held constant. Height was found still not significantly related to the assault rate under any combination of assignment and seniority, as shown in Table 12. The sample sizes are small and only large trends would have been statistically significant.

Table 12

THE RELATIONSHIP BETWEEN OFFICERS' HEIGHTS AND ASSAULTS IN DALLAS WHEN ASSIGNMENTS AND SENIORITY ARE HELD CONSTANT

YEAR JOINED THE DEPARTMENT (Seniority)	HEIGHT (Inches)	OFFICERS, BY CURRENT ASSIGNMENT							
		Patrol				Other			
		Random Sample of Officers		Assaulted Officers		Random Sample of Officers		Assaulted Officers	
		(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)
After 1968	69 or less	29	10	22	22	34	11	14	4
	70-72	44	15	45	46	44	14	68	19
	73 or more	26	9	33	34	22	7	18	5
	All heights	100	34	100	102	100	32	100	28
1968 or Earlier	69 or less	15	4	25	6	25	11	26	7
	70-72	50	13	58	14	48	21	48	13
	73 or more	35	9	17	4	27	12	26	7
	All heights	100	34	100	102	100	32	100	28

CONCLUSION: Among the four groups of officers determined by assignment (patrol, other) and seniority (joined before or after 1968) there was no statistically significant relationship between assault rates and heights. (The researchers suggest that no importance be attached to the apparent concentration of assaults among middle-height officers--70 to 72 inches--who had non-patrol assignments. While the chi-square was 4.12 [probability= 0.12], there is no analytical reason for this difference, and it should therefore be ignored).

Auto Accidents

During the sample period, about one quarter of the random sample of officers were involved in auto accidents. Taller officers had a slight tendency to be involved in fewer accidents; however, there was about a one-in-seven probability that the trend was the result of chance alone. The trend is shown in Table 13.

Table 13

HEIGHT AND AUTO ACCIDENTS FOR DALLAS SAMPLE OF OFFICERS

HEIGHT (Inches)	OFFICERS, BY AUTO ACCIDENTS DURING SAMPLE PERIOD						ACCIDENTS PER OFFICER
	None		One or More		Total		
	(%)	(N)	(%)	(N)	(%)	(N)	
69 and under	72	26	28	10	100	36	0.28
70 - 72	73	46	27	17	100	63	0.31
73 and above	89	32	11	4	100	36	0.17
All heights	77	104	23	31	100	135[a]	0.26

NOTE: Data are from May 5, 1973 to June 15, 1974.

[a] Excludes two officers for whom data on numbers of auto accidents were missing.

CONCLUSION: The trend is for a tall officer to be involved in slightly fewer traffic accidents, although the effect is not statistically significant at the 0.10 level (chi-square = 3.91, probability = 0.15).

Sick Leave

Officers took an average of 2.2 sick leave days during the sample period. Forty percent of the officers took no sick leave. Officers of different heights took similar amounts of sick leave (see Table 14). Although there is a trend for shorter officers to take more sick leave days, the statistical significance is strongly dependent on how the data are grouped by height.

Table 14

SICK LEAVE USED BY OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY DAYS OF PAID SICK LEAVE DURING SAMPLE PERIOD						SICK LEAVE DAYS PER OFFICER
	None		One or More		Total		
	(%)	(N)	(%)	(N)	(%)	(N)	
69 and under	29	10	71	25	100	35	3.0
70 - 72	44	26	56	33	100	59	1.7
73 and above	46	17	54	20	100	37	2.2
All heights	40	53	60	78	100	131[a]	2.2

NOTE: Data are from May 5, 1973 to June 15, 1974.

[a] Excludes six officers whose sick leave data were missing.

CONCLUSION: No statistically significant trend is noted linking the three height categories and sick leave (chi-square = 2.83 with 2 degrees of freedom, probability = 0.24). However, if the taller two height categories are grouped together and a 2 by 2 chi-square test is performed, the chi-square value is 2.80, which is statistically significant at the 0.10 level.

Injuries

During the sample period, 14 percent of the officers in the random sample were injured. Injury experience was the same regardless of officers' heights, as shown in Table 15.

Table 15

INJURIES TO OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS, BY TIMES INJURED ON DUTY DURING SAMPLE PERIOD						INJURIES PER OFFICER DURING SAMPLE PERIOD
	None		One or More		Total		
	(%)	(N)	(%)	(N)	(%)	(N)	
69 and under	86	31	14	5	100	36	0.14
70 - 72	86	54	14	9	100	63	0.16
73 and above	86	31	14	5	100	36	0.14
All heights	86	116	14	19	100	135[a]	0.15

NOTES: Data are from May 5, 1973 to June 15, 1974.

Chi-square = 0.005, probability = 1.0.

[a] Excludes two officers whose injury data were missing.

Department Commendations

The distribution of department commendations was fairly broad, with 60 percent of all the officers in the sample receiving at least one commendation during the sample period. The differences among officers of different heights was not statistically significant (see Table 16.)

Table 16

DEPARTMENT COMMENDATIONS RECEIVED BY OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS RECEIVING DIFFERENT NUMBERS OF DEPARTMENT COMMENDATIONS						COMMENDATIONS PER OFFICER
	None		One or More		Total		
	(%)	(N)	(%)	(N)	(%)	(N)	
69 and under	50	18	50	18	100	36	0.9
70 - 72	32	20	68	42	100	62	1.5
73 and above	44	16	56	20	100	36	0.8
All heights	40	54	60	80	100	134[a]	1.2

NOTE: Data are from May 5, 1973 to June 15, 1974.

[a] Excludes three officers whose commendation data were missing.

CONCLUSION: Officers of different heights received similar numbers of commendations (chi-square = 3.33, probability = 0.18).

Department Complaints

Department complaints were lodged against only 24 percent of the officers, and there were no statistically significant differences among officers of different heights, as shown in Table 17.

Table 17

DEPARTMENT COMPLAINTS RECEIVED BY OFFICERS OF DIFFERENT HEIGHTS IN DALLAS

HEIGHT (Inches)	OFFICERS RECEIVING DIFFERENT NUMBERS OF DEPARTMENT COMPLAINTS						COMPLAINTS PER OFFICER DURING SAMPLE PERIOD
	None		One or More		Total		
	(%)	(N)	(%)	(N)	(%)	(N)	
69 and under	78	28	22	8	100	36	0.25
70 - 72	73	44	27	16	100	60	0.43
73 and above	78	29	22	8	100	37	0.38
All heights	76	101	24	32	100	133[a]	0.37

NOTES: Data are from May 5, 1973 to June 15, 1974.

Chi-square = 0.41, probability = 0.83.

[a] Excludes four officers whose complaint data were missing.

Overview of Different Performance Measures

Even though no single performance measure showed a statistically significant difference for officers of different heights, one might still ask if any pattern might be found among all the performance measures, when considered together. To see if there was a pattern among six different performance measures, officers were grouped into three height categories, each of which was assigned a rating of best, mid or worst, depending on the rankings assigned in Table 2 and in Tables 13 through 17.

The rankings constructed in this fashion showed no pattern, as can be seen from Table 18. Had the rankings been assigned randomly, the chance of getting four or more worst rankings would have been 0.18. Even though the 70 - 72 inch height category received four of six worst ratings, it was concluded that this pattern, which has no theoretical justification, might have occurred by chance alone and should not be considered statistically significant.

TABLE 18

RANKINGS OF OFFICERS OF DIFFERENT HEIGHTS ON PERFORMANCE MEASURES IN DALLAS

PERFORMANCE MEASURE[a]	RELATIVE RATINGS BY HEIGHT CATEGORY			IS THE TREND STATISTICALLY SIGNIFICANT[b]
	69 inches and under	70 - 72 inches	73 inches and above	
Assault rate	Best	Worst	Mid	No
Auto accidents	Mid	Worst	Best	No
Sick leave	Worst	Best	Mid	No
On-duty injuries	Best/Mid	Worst	Best/Mid	No
Department commendations	Mid	Best	Worst	No
Department complaints	Best	Worst	Mid	No

NOTE: Data are from May 5, 1973 to June 15, 1974.

[a] Average per officer

[b] At the 0.1 level.

Other Predictors of Assault Rates

Had short officers received a disproportionately large share of assaults (e.g., if X percent of the officers were short and they received Y percent of the assaults, with X being much smaller than Y), it would have been said that height was a good predictor of assaults. For the purpose of selecting officers in order to reduce the number of assaults in the department, one might then have selected taller officers. However, if the purpose is to reduce assaults, one might also examine other officer characteristics to determine whether there are some potentially more powerful predictors of assaults than height. If there are such predictors, then perhaps they might be used as selection criteria in preference to height. In this section of the report, some other possible predictors are examined. This portion of the study includes:

- the calculated differences between the percent of randomly selected officers with a given characteristic and the percent of assaulted officers with that characteristic, and
- the computed percent change in the assault rate that would have occurred if all officers with that characteristic had not been in the department in the sample period (and assaults on them had not occurred to others).

Table 19 shows that two officer characteristics, education and police academy scores, are better predictors of assaults than height. While the height standard has but a minimal effect on the assault rate, level of education and police academy scores might have a substantial effect. Further examination of the education variable indicates, however, that more highly educated officers have been hired only recently in Dallas, and the relatively higher rate of assaults of this group may be due to its lack of experience and seniority rather than to education received.

The statistical significance of the characteristics displayed in Table 19 has been examined. Height is the only characteristic in the table whose relationship to assaults is not statistically significant at the 0.10 level.

Table 19

RELATIVE STRENGTH OF FOUR POSSIBLE ASSAULT RATE PREDICTORS

CHARACTERISTIC	OFFICERS WITH THE CHARACTERISTIC (%)	ASSAULTED OFFICERS WITH THE CHARACTERISTIC (%)	CHANGE IN ASSAULT RATE FROM DROPPING OFFICERS WITH CHARACTERSITIC (%)
69 inches or shorter	26	22	+ 9
70 inches to 72 inches	47	50	- 6
More than High School Education	48	66	-34
Police Academy Average Below 90	53	70	-36

CONCLUSION: If police agencies desire to reduce assaults on officers, the height of officers may be a relatively poor criterion. It would be more rational, considering only the Dallas data, to refuse to select officers who had more than a high school education or who scored less than 90 in the police academy. (However, it is believed that the conclusion regarding more highly educated officers would be erroneous because the department has recently begun hiring more of these officers and they are among the less senior and, possibly, the more exposed to risk [see Table 20].)

Over the years, the percentage of officers entering the department with more than a high school education has increased sharply (see Table 20). The more recently hired officers have had more years of formal education but fewer years of police experience; and they have suffered more assaults. This puts the more educated Dallas officer in an analagous position to the shorter officers of many other departments. Since no comparison may be made with less educated officers with the same experience, no conclusions should be made about the effect of education on the performance of officers.

TABLE 20

EDUCATION AND YEAR JOINED DEPARTMENT FOR RANDOM SAMPLE OF OFFICERS IN DALLAS

YEAR JOINED DEPARTMENT	OFFICERS, BY EDUCATION					
	High School or Less		More than High School		Total	
	(%)	(N)	(%)	(N)	(%)	(N)
1964 or earlier	71	27	29	11	100	38
1965 - 1969	68	23	32	11	100	34
1970 or later	31	18	69	40	100	58
All years	52	68	48	62	100	130[a]

NOTE: Data are from May 1973 to June 1974.

[a] Excludes seven officers whose education data were missing.

The Relationships Between Assaults and Other Performance Measures

In this section of the report, other characteristics of officers who are involved in assaults are examined. The picture appears to be one of an officer who is generally more active than the officer who is not assaulted. More specifically, assaults tend to occur to officers who

- are involved in more auto accidents,
- use paid injury leave more often,
- receive more department commendations,
- receive more department complaints,
- are injured more,
- are more frequently assigned to patrol.

All the above characteristics are statistically significant, as shown in Table 21.

The Interrelationship Between Height and Characteristics of Assaults

This section of the report examines the relationship between officers' heights and the nature of the assaults in which they were involved. Seventeen aspects of the 181 assaults in Dallas were examined. Sixty-four percent of the assaults occurred when an officer was either responding to a disturbance or attempting an arrest. In 68 percent of the assaults, officers used their hands or feet as weapons--shorter officers being no more or less likely to resort to the use of firearms than were taller officers. Most of the assaults occurred to officers who were in uniform, with another officer present. (See Table 22 for a summary of the activities of the officers at the scenes of assaults.)

Table 21

COMPARISON OF PERFORMANCE DATA FOR ASSAULTED OFFICERS AND FOR A RANDOM SAMPLE OF OFFICERS IN DALLAS

PERFORMANCE CHARACTERISTICS	SAMPLE OF ALL OFFICERS IN DEPARTMENT[a] (%)	(N)	SAMPLE OF ASSAULTED OFFICERS[b] (%)	(N)
Assignment[c]				
Patrol	43	59	69	125
Special ops., CID, vice, drugs	31	42	18	32
All Other	26	36	13	24
Total[d]	100	137	100	181
Auto accidents[c]				
None	77	104	48	86
One or more	23	31	52	95
Total[d]	100	135	100	181
Days on sick leave				
None	40	53	31	57
One or more	60	78	69	124
Total[d]	100	131	100	181
Days on paid injury leave				
None	98	132	87	157
One or more	2	3	13	24
Total[d]	100	135	100	181
Department commendations[e]				
None	40	54	28	50
One or more	60	80	72	130
Total[d]	100	134	100	180
Department complaints[e]				
None	76	101	63	112
One or more	24	32	37	65
Total[d]	100	133	100	177
Times injured on duty				
None	86	116	20	37
One or more	14	19	80	144
Total[d]	100	135	100	181

NOTE: Data are from May 5, 1973 to June 15, 1974.

a N = 137

b N = 181

c Statistically significant at 0.05 level.

d Excluding missing data.

e Statistically significant at 0.10 level.

Table 22

ACTIVITIES OF OFFICERS AT TIME OF ASSAULT IN DALLAS

OFFICER'S ACTIVITY	(%)	(N)	IS THERE A STATISTICALLY SIGNIFICANT REALTIONSHIP WITH OFFICER'S HEIGHT?[a]
ACTIVITY TYPE			
Responding to a disturbance	33	58	
Attempting arrest	31	55	
Handling prisoners	3	5	
Traffic pursuits and stops	8	15	Yes[b]
All other	25	45	
Total[c]	100	178	
WEAPON USED BY OFFICER			
None	15	24	
Hands and/or feet	68	107	
Discharge firearms	15	24	No
Other	1	2	
Total[c]	100	157	
DUTY STATUS			
On duty, in uniform, other officers present	57	98	
On duty, in uniform, other officers not present	15	26	
On duty, in uniform, missing data on other officers presence	18	31	No
On duty, not in uniform	5	8	
Off duty	6	10	
Total[c]	100	173	

NOTE: Data are from May 5, 1973 to June 15, 1974.

a At the 0.10 level.

b See Table 23 for the nature of the relationship between officers' type of activity and height.

c Exluding missing data.

Significant and Nonsignificant Relationships

Of the 17 aspects of assaults that were examined, only the following three were found to have a statistically significant relationship to height:

- Most assaults (74 percent) on officers who were taller than 69 inches occurred while they were responding to a disturbance or were attempting an arrest. Most assaults (55 percent) on officers who were, at most, 69 inches tall occurred in traffic pursuits or stops, handling prisoners, and other situations (see Table 23).

- Only four percent of assaults on officers over six feet tall were by intoxicated or otherwise abnormally behaving individuals, as compared to 23 percent of the assaults on shorter officers (see Table 24).

- Eighteen percent of assault-related injuries to officers over six feet tall occurred in incidents involving the injury of more than one officer. Only eight percent of injuries to shorter officers involved the simultaneous injury of another officer (see Table 25).

Table 23

HEIGHT AND ACTIVITY OF ASSAULTED OFFICER AT TIME OF ASSAULT IN DALLAS

HEIGHT (Inches)	ASSAULTS, BY ACTIVITY OF OFFICER AT TIME OF ASSAULT							
	Responding to Disturbance		Attempting Arrest (all types)		Handling Prisoners, Traffic Pursuits and Stops, and All Other		Total	
	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	29	11	16	6	55	21	100	38
70 - 72	27	25	38	35	34	31	100	91
73 and over	45	22	29	14	27	13	100	49
All heights	33	58	31	55	37	65	100	178

[a] Excludes three events for which activity data were missing.

CONCLUSION: Assaults on taller officers occurred more frequently while responding to a disturbance or attempting an arrest, as compared to assaults on shorter officers (chi-square = 12.9, probability = 0.012).

Table 24

HEIGHT OF ASSAULTED OFFICER AND
ASSAILANT'S MENTAL STATE IN DALLAS

HEIGHT (Inches)	ASSAILANTS, BY MENTAL STATE					
	Normal		Intoxicated, High on Drugs, or Mentally Impaired		Total	
	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	76	24	24	9	100	38
70 - 72	77	69	23	21	100	90
73 and over	96	43	4	2	100	45
All heights	82	141	18	32	100	173[a]

NOTE: Data are from May 5, 1973 to June 15, 1974.

a Excluding nine events for which data on assailant characteristics were missing.

CONCLUSION: Of the assaults made on officers over six feet tall, a much lower percentage are by intoxicated or otherwise abnormally behaving individuals as compared to the percent for shorter officers (chi-square = 8.07, probability = 0.017).

Table 25

HEIGHT OF ASSAULTED OFFICERS AND INJURIES TO OTHER OFFICERS IN DALLAS

HEIGHT (Inches)	ASSAULTS, BY INJURIES TO OTHER THAN OFFICER ASSAULTED					
	None		Other Officer		Total	
	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	97	37	3	1[a]	100	38
70 - 72	90	80	10	9	100	89
73 and over	82	41	18	9	100	50
All heights	89	158	11	19	100	177

NOTE: Data are from May 5, 1973 to June 15, 1974.

[a] The other person who was injured in this incident was a fireman, not a police officer.

CONCLUSION: Shorter officers were more frequently the only officers injured in an incident (chi-square = 5.12, probability = 0.078).

Height was found not to have a statistically significant relationship to any of the following fourteen characteristics of an assault:

- officer's use of a weapon,
- officer's duty status, including whether the officer was in uniform or was working with at least one other officer,
- sex of assailant(s),
- race of assailant(s),
- age of assailant(s),
- number of assailants,
- whether the assailants were known by an officer prior to the assault,
- direction of the assault,
- whether the assault involved a sniper, ambush, or trap,
- type of weapon used by the assailant,
- whether the officer was injured,
- type of injury to the officer,
- whether the injury caused the officer to miss work,
- whether the injury caused the officer to be assigned to light duty.

Other Characteristics of Assaults

Assailants tended to be young (55 percent between ages 20 and 30) males (89 percent) who were not affected by intoxication, drugs, or mental impairment (82 percent); and who were not previously known to the assaulted officer (99 percent) (see Table 26).

Table 26

CHARACTERISTICS OF ASSAILANTS IN DALLAS

ASSAILANTS'S CHARACTERISTICS		(%)	(N)	IS THERE A STATISTICALLY SIGNIFICANT RELATIONSHIP WITH OFFICER'S HEIGHT?[a]
Sex	Males	89	162	
	Females	11	20	No
	Total sample[b]	100	182	
Race	Caucasian	54	96	
	Black	42	75	No
	Other	4	8	
	Total sample[b]	100	179	
Age	0 to 12 years of age	0	1	
	13 - 19	17	32	
	20 - 30	55	102	No
	Over 30	28	52	
	Total sample[b]	100	187	
Number of assailants in the incident	One	92	164	
	Two	5	9	No
	Three or more	3	6	
	Total sample[b]	100	177	
Assailants' behavior	Normal	82	141	
	Intoxicated	14	25	Yes[c]
	High on drugs	2	3	
	Mentally impaired	2	4	
	Total sample[b]	100	173	
Identity known by officer prior to assault	Yes	1	2	
	No	99	170	No
	Total sample[b]	100	172	

NOTE: Data are from May 5, 1973 to June 15, 1974.

a
At the 0.10 level.

b
Excluding missing data.

c
See Table 24 for the nature of the relationship between the height of an officer and assailant's behavior.

Almost all assaults (92 percent) were frontal attacks on the officer, as shown in Table 27. In one third of the incidents, assailants used or threatened use of weapons other than parts of the body (e.g., hands, feet). Firearms were the most common weapon, but caused only two percent of the assault injuries. The use of a firearm was at least threatened in 17 percent of the incidents.

Sixty-two percent of the assaults reported in Dallas resulted in some injury to an officer, but only ten percent of the injuries caused the officers to be absent from work. In ten percent of the assaults in which officers were injured, their partners were also injured. Partners of shorter officers were less frequently injured than were partners of taller officers (see Table 25).

The Cost of Assaults: Paid Injury Leave

An average of about two hours of injury leave were taken per man-year as the result of assaults in Dallas. Because the average length of paid injury leave was not available in the Dallas data, an estimate of the length of leave was taken from data contained in the Uniform Crime Reports for 1972. Using the UCR data, it was estimated that injuries lasted between three and nine days, and, therefore, it was decided to use six days as the nominal value from which to make the calculations in this section of the report.

During the 13-month sample period in Dallas, there were 182 assaults among 750 officers in the department, or 0.22 assaults per man-year which is slightly higher than the national average of 0.15 assaults per man-year in 1972. An estimated 62 percent of the assaults, a higher rate than the national average of 38 percent of 1972, resulted in an injury to an officer, and, of the injured officers, ten percent missed some workdays due to their injury. Estimating that six workdays were lost per injury, there were 0.08 days of injury leave resulting from assaults per man-year. The calculation follows:

$$\frac{0.22 \text{ assaults}}{\text{man-year}} \times \frac{0.62 \text{ injuries}}{\text{assault}} \times \frac{0.10 \text{ work-loss injuries}}{\text{injury}} \times \frac{6 \text{ days injury leave}}{\text{work-loss injury}}$$

$$= \frac{0.08 \text{ days of injury leave}}{\text{man-year.}}$$

Table 27

TYPE OF ASSAULT IN DALLAS

ASSAULT TYPE	(%)	(N)	IS THERE A STATISTICALLY SIGNIFICANT RELATIONSHIP WITH THE OFFICER'S HEIGHT?[a]
Officer assaulted from			
Front	92	163	
Side and/or rear	8	14	No
Total[b]	100	177	
Sniper, ambush, or trap			
Yes	3	4	
No	97	130	No
Total[b]	100	134	
Assailants used or threatened the use of a weapon			
Hand, fist, feet, etc.	67	119	
Firearm	17	31	
Cutting instrument	6	11	No
Others or other combinations	10	18	
Total[b]	100	179	

NOTE: Data are from May 5, 1973 to June 15, 1974.

a
At the 0.10 level.

b
Excluding missing data.

III. NASSAU COUNTY, NEW YORK

The Nassau County Police Department (New York State) had 3,927 officers during the survey period of January 1, 1972 through June 30, 1974. During the survey period, there were 336 assaults on officers. Some of the assaulted officers were not assigned to patrol precincts and would, therefore, have been difficult to match to officers in a comparison group. Hence, data were collected only for the 223 assaulted officers who were assigned to patrol precincts. A comparison group of 336 officers who were not assaulted was identified, and 251 of these were "randomly selected as they appeared on rosters of each of eight patrol precincts based on the alphabet."[14]

The data submitted for analysis did not contain information on either the seniority of the officers or the shifts to which they were assigned, which prevented the researchers from conducting a preliminary analysis to determine whether officers' heights were correlated with some other background characteristics.

Data on the following six performance measures were collected for the assaulted officers and the comparison group:

- assaults (including attempted assaults and assaults resulting in deliberate or accidental injuries),
- auto accidents,
- citizen complaints,
- department commendations,
- department complaints (resulting in at least the preparation of an official department form--"Form 209"),
- injuries on duty.

Of these six measures, only the number of sustained citizen complaints per officer was related to height in a statistically significant way--with the number of complaints against shorter officers being more numerous than against taller officers (see Table 28).

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14. Louis J. Frank, Commissioner of Police, Nassau County Police Department, to Tom White, The Urban Institute (December 20, 1974).

Table 28

SUMMARY OF RELATIONSHIPS BETWEEN HEIGHT AND PERFORMANCE MEASURES IN NASSAU COUNTY

PERFORMANCE MEASURE	DO THE DATA SHOW A STATISTICALLY SIGNIFICANT RELATIONSHIP BETWEEN HEIGHT AND THE PERFORMANCE MEASURE?[a]
Assaults	No
Injuries on Duty	No
Department Commendations	No
Department Complaints (Form 209)	No
Sustained Citizen Complaints	Yes
Department Auto Accidents	No

NOTE: Data are from January 1972 to June 1974.

[a] At the 0.10 level of significance.

RELATIONSHIP BETWEEN HEIGHT AND PERFORMANCE

This section of the report briefly discusses each of the performance variables and its relationship to height.

Assaults

No significant relationship was found between height and assaults. The data are displayed in Table 29, which shows the percent of assaulted and non-assaulted officers of different heights.

Table 29

COMPARISON OF SAMPLES OF ASSAULTED AND NON-ASSAULTED OFFICERS OF DIFFERENT HEIGHTS IN NASSAU COUNTY

HEIGHT (Inches)	NUMBER OF OFFICERS IN SAMPLE		CUMULATIVE PERCENT BY HEIGHT		DIFFERENCE BETEEN CUMULATIVE PERCENTS
	Non-Assaulted	Assaulted	Non-Assaulted	Assaulted	
68	31	27	12.3	12.1	-0.2
69	66	57	38.6	37.7	-1.2
70	43	43	55.8	56.9	1.1
71	43	36	72.9	73.1	0.2
72	32	24	85.7	83.6	-1.8
73	24	10	95.2	88.3	-6.9[a]
74	8	16	98.4	95.5	-2.9
75	2	7	99.2	98.6	-0.6
76	2	1	100.0	99.1	-0.9
77	0	2	100.0	100.0	0.0
Total	251	223			

NOTE: Data are from Jan. 1, 1972 to June 30, 1974.

a This is the greatest difference in the cumulative percents of non-assaulted and assaulted officers. The difference is not statistically significant, even at the 0.20 level. (Note that officers who were 73 inches or shorter were slightly less likely to be assaulted than were the taller officers.)

Injuries

There was no significant trend relating height and injuries. The distribution of on-duty injuries for officers of different heights is shown in Table 30, which indicates that there were no statistically significant differences between assaulted and non-assaulted officers of different heights. Since the assaulted and non-assaulted groups have the same height distribution, the data have been combined in Table 31 which presents the number of injuries (rather than just the number of injured people) for a combined sample consisting of the assaulted and non-assaulted groups. This table shows that there were no statistically significant differences in injuries to shorter or taller officers.

Other Performance Data

Data for commendations, complaints, and auto accidents have been combined, since the rates per officer in the two groups (assaulted versus non-assaulted) were not significantly different, and there was no significant difference in the height distributions.

The data for these additional performance measures are displayed in a series of tables, as follows:

- department commendations — Table 32
- department complaints — Table 33
- citizen complaints — Table 34
- auto accidents — Table 35

No significant trends were observed in comparing an officer's height with department commendations, department complaints, or auto accidents.

The single significant trend showed that a shorter officer had a higher chance of getting a sustained citizen complaint. Although only 38 percent of the officers in the sample were 69 inches tall or less, they received 74 percent of all sustained citizen complaints. During a two and one half year period there were 39 sustained citizen complaints among the 474 officers in the combined sample, or one complaint for every 30 officer-years worked. The shorter officers (69 inches or less) received one complaint per 16 man-years worked, compared to one complaint per 73 man-years worked for the taller officers.

Table 30

INJURIES TO ASSAULTED AND NON-ASSAULTED OFFICERS OF DIFFERENT HEIGHTS IN NASSAU COUNTY

HEIGHT (Inches)	NUMBER OF OFFICERS IN SAMPLE		TOTAL NUMBER OF ON-DUTY INJURIES TO OFFICERS IN SAMPLE		CUMULATIVE PERCENT OF ON-DUTY INJURIES BY HEIGHT		DIFFERENCE BETWEEN CUMULATIVE PERCENTS
	Non-Assaulted	Assaulted	Non-Assaulted	Assaulted	Non-Assaulted	Assaulted	
68	31	27	16	56	10.0	13.8	-3.8
69	66	57	36	89	32.5	35.7	-3.2
70	43	43	30	68	51.3	52.4	-1.1
71	43	36	30	51	70.0	64.9	5.1
72	32	24	15	87	79.4	86.3	-6.9[a]
73	24	10	20	18	91.9	90.8	1.1
74	8	16	10	23	98.1	96.4	1.7
75	2	7	2	8	99.4	98.4	1.0
76	2	1	1	4	100.0	99.4	0.6
77	0	2	0	2	100.0	100.0	0.0
Total	251	223	160	406			

NOTE: Data are from Jan. 1, 1972 to June 30, 1974.

[a]This is the greatest difference in the cumulative percents of officers who were not assaulted and of officers who were assaulted. The difference is not statistically significant, even at the 0.2 level of significance.

Table 31

INJURIES FOR COMBINED SAMPLE OF OFFICERS OF DIFFERENT HEIGHTS IN NASSAU COUNTY

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE BETWEEN CUMULATIVE PERCENTS
	Officers in Combined Sample	Injuries	Officers	Injuries	
68	58	72	12.2	12.7	-0.5
69	123	125	38.0	34.7	3.3
70	86	98	56.1	51.9	4.2
71	79	81	72.7	66.2	6.5[a]
72	56	102	84.4	84.1	0.3
73	34	38	91.6	90.8	0.8
74	24	33	96.7	96.6	0.1
75	9	10	98.5	98.4	0.1
76	3	5	99.1	99.3	-0.2
77	2	2	100.0	100.0	0.0
Total	474	566			

NOTE: Data are from January 1, 1972 to June 30, 1974.

[a] This is the greatest difference in the cumulative percents of the the number of officers and of the number of injuries. The difference is not statistically significant, even at the 0.20 level. (Note that officers 71 inches and shorter were slightly less likely to be assaulted than were taller officers.)

Table 32

DEPARTMENT COMMENDATIONS FOR COMBINED SAMPLE OF OFFICERS OF DIFFERENT HEIGHTS IN NASSAU COUNTY

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE BETWEEN CUMULATIVE PERCENTS
	Officers in Combined Sample	Department Commendations	Officers	Commendations	
68	58	17	12.2	17	-4.8[a]
69	123	19	38.0	36	2.0
70	86	17	56.1	53	3.0
71	79	16	72.7	69	3.7
72	56	11	84.4	80	4.4
73	34	12	91.6	92	-0.4
74	24	3	96.7	95	1.7
75	9	3	98.5	98	0.5
76	3	1	99.1	99	0.1
77	2	1	100.0	100.0	0.0
Total	474	100			

NOTE: Data are from January 1, 1972 to June 30, 1974.

[a] This is the greatest difference in the cumulative percents of the number of officers and number of commendations. The difference is not statistically significant, even at the 0.20 level of significance.

Table 33

DEPARTMENT COMPLAINTS (FORM 209) FOR COMBINED SAMPLE OF OFFICERS OF DIFFERENT HEIGHTS IN NASSAU COUNTY

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE BETWEEN CUMULATIVE PERCENTS
	Officers in Combined Sample	Department Complaints (Form 209)	Officers	Complaints	
68	58	4	12.2	5.7	6.5
69	123	17	38.0	30.0	8.0
70	86	10	56.1	44.3	11.8[a]
71	79	16	72.7	67.1	5.6
72	56	7	84.4	77.1	7.3
73	34	11	91.6	92.8	-1.2
74	24	5	96.7	100.0	-3.3
75	9		98.5	100.0	-1.5
76	3		99.1	100.0	-0.9
77	2		100.0	100.0	0.0
Total	474	70			

NOTE: Data are from January 1, 1972 to June 30, 1974.

[a] This is the greatest difference in the cumulative percents of the number of officers and number of complaints. The difference is not statistically significant, even at the 0.20 level of significance.

Table 34

SUSTAINED CITIZEN COMPLAINTS FOR COMBINED SAMPLE OF OFFICERS OF DIFFERENT HEIGHTS IN NASSAU COUNTY

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE BETWEEN CUMULATIVE PERCENTS
	Officers in Combined Sample	Sustained Citizen Complaints	Officers	Sustained Complaints	
68	58	7	12.2	17.9	-5.7
69	123	21	38.0	74.4	-36.4[a]
70	86	2	56.1	79.5	-23.4
71	79	4	72.7	89.7	-17.0
72	56	4	84.4	100.0	-15.6
73	34		91.6		
74	24		96.7		
75	9		98.5		
76	3		99.1		
77	2		100.0		
Total	474	38			

NOTE: Data are from January 1, 1972 to June 30, 1974.

[a] This is the greatest difference in the cumulative percents of the number of officers and number of sustained complaints. The difference is statistically significant at the 0.001 level of significance. Officers who are 5 feet 9 inches or shorter received more sustained citizen complaints than did taller officers.

Table 35

ACCIDENTS IN DEPARTMENT VEHICLES FOR COMBINED SAMPLE OF OFFICERS OF DIFFERENT HEIGHTS IN NASSAU COUNTY

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE BETWEEN CUMULATIVE PERCENTS
	Officers in Combined Sample	Accidents in Department Vehicles	Officers	Accidents	
68	58	25	12.2	10.4	1.8
69	123	56	38.0	33.7	4.3[a]
70	86	48	56.1	53.7	2.4
71	79	46	72.7	72.8	-0.1
72	56	32	84.4	86.1	-1.7
73	34	17	91.6	93.2	-1.6
74	24	12	96.7	98.2	-1.5
75	9	2	98.5	99.0	-0.5
76	3	2	99.1	100.0	-0.9
77	2		100.0		0.0
Total	474	240			

NOTE: Data are from January 1, 1972 to June 30, 1974.

[a] This is the largest difference and is not statistically significant, even at the 0.20 level of significance.

PERFORMANCE MEASURES: ASSAULTED VERSUS NON-ASSAULTED OFFICERS

In this section of the report, data on assaulted officers were examined to determine how they differ from data on non-assaulted officers. As expected, it was found that assaulted officers were injured more frequently than non-assaulted officers--with the injury rate of non-assaulted officers being only 35 percent of that for assaulted officers, implying that at most 65 percent of injuries suffered by assaulted officers were the result of the assaults. There were no significant differences between assaulted and non-assaulted officers in complaints, commendations, or auto accidents (see Table 36).

Table 36

COMPARISON OF ASSAULTED WITH NON-ASSAULTED OFFICERS ON PERFORMANCE MEASURES IN NASSAU COUNTY

PERFORMANCE MEASURES	ASSAULTED OFFICERS		NON-ASSAULTED OFFICERS
Number in sample	223		251
Department commendations per officer in sample	0.24		0.18
Department complaints (Form 209) per officer in sample	0.17		0.13
Sustained citizen complaints per officer in sample	0.076	[a]	0.083
Departmental auto accidents per officer in sample	0.53		0.49
On-duty injuries per officer in sample	1.82		0.64

NOTE: Data are from January 1, 1972 to June 30, 1974.

[a] Statistically significant at the 0.10 level.

IV. OTHER POLICE DEPARTMENTS

This chapter discusses the analysis of data submitted by Des Moines, Iowa; Dade County, Florida; and Oakland, California. For various reasons explained in this chapter, the data from these areas were considered to be of less importance than the data from Dallas and Nassau County.

DES MOINES

Since the Des Moines Department of Police adhered to the original data collection scheme and provided information limited to the height of 181 assaulted or injured officers and 181 non-assaulted officers, only a Phase One analysis was conducted on these data. It was determined that an officer's height was not significantly related to the likelihood of an assault or injury. Consequently, no further data were requested from the department. The data from Des Moines, covering the period of May 15, 1972 through March 13, 1974, are displayed in Table 37.

DADE COUNTY

The Public Safety Department of Metropolitan Dade County, Florida provided data on assaults (i.e., substantiated verbal assaults, assault and battery, and incidents of resisting arrest). The 355 officers who were assaulted during the sample period of September 1, 1973 to April 30, 1974, were involved in 253 cases, some of which involved assaults on more than one officer. Data included detailed information on the duty status of the officer involved in an assault, on the characteristics of the assailant, and on whether a weapon was used.

Dade County also provided data on a sample of 1,142 sworn personnel that included ranked officers (lieutenants and sergeants) and unranked officers. Data on these personnel were for the same sample period. In this data, it was found that sergeants and lieutenants were taller than unranked officers and were involved in far fewer assaults. These trends are shown in Table 38.

Table 37

ASSAULTS AND INJURIES TO OFFICERS IN DES MOINES

HEIGHT (Inches)	NUMBERS		CUMULATIVE PERCENT		DIFFERENCE IN PERCENTS
	Sample of Officers	Sample of Incidents	Sample of Officers	Sample of Incidents[a]	
69	37	54	20.4	29.8	-9.4
70	41	33	43.1	48.1	-5.0
71	30	32	59.7	65.7	-6.0[b]
72	23	19	72.4	76.2	-3.8
73	20	13	83.4	83.4	0.0
74	16	24	92.3	96.7	4.4
75	14	6	100.0	100.0	0.0
All heights	181	181			

NOTE: Data are from May 15, 1972 to March 13, 1974.

a Incidents were either assaults on officers or injuries to officers.

b This is the greatest difference between the cumulative percents of officers and incidents. It is not statistically significant, even at the 0.20 level of significance.

Table 38

SUMMARY OF THE ASSAULT EXPERIENCE OF OFFICERS, SERGEANTS, AND LIEUTENANTS IN DADE COUNTY

ASSAULT EXPERIENCE	UNRANKED OFFICERS	SERGEANTS	LIEUTENANTS
Number in department June 1974	869	210	63
Percent under 70 inches	31.6	20.0	12.7
Shortest height (inches)	62	63	68
Number of assaults	341	13	1
Assaults per officer during sample period	0.392[a]	0.062	0.016
Percent of assaults where officer injured	57.8	38.5	0

NOTE: Data are from September 1973 to April 1974.

[a] The number of assaults on unranked officers was greater than both the number of assaults on sergeants and on lieutenants. The difference is statistically significant at the 0.01 level of significance.

The data provided by Dade County on the sample of 1,142 sworn personnel did not permit a comparison of seniority or assignments. Nevertheless, an analysis was conducted of the physical assault experience (excluding verbal assaults) of the unranked officers in this sample. Based on this analysis it was determined that

- the height of officers did not influence the likelihood that they would be assaulted; and
- the height of officers did not influence the likelihood that they would be injured as the result of an assault (see Table 39).

Table 39

ASSAULTS BY HANDS, FISTS, FEET, TEETH, OR BODILY FORCE
ON OFFICERS OF DIFFERENT HEIGHTS IN DADE COUNTY

HEIGHT (Inches)	OFFICERS		OFFICERS ASSAULTED BY HANDS, FISTS, FEET, TEETH, OR BODILY FORCE					
			OFFICER INJURED		OFFICER NOT INJURED		TOTAL	
	(N)	Cumulative (%)	(N)	Cumulative (%)	(N)	Cumulative (%)	(N)	Cumulative (%)
62	1	0.1						
63	1	0.2			1	1.0	1	0.3
64	5	0.8	1	0.6			1	0.7
65	3	1.2						
66	7	2.0			1	2.0	1	1.1
67	51	7.8	14	8.7	6	7.9	20	8.4
68	94	18.6	24	22.5	11	18.8	35	21.2[a]
69	113	31.6	15	31.2	12	30.7	27	31.0
70	139	47.6	26	46.2	14	44.5	40	45.6
71	145	64.3	27	61.8	29	73.3[b]	56	66.1
72	139	80.3	27	77.5	8	81.2	35	78.8
73	61	87.3	10	83.2	9	90.1	19	85.8
74	57	93.9	12	90.1	5	95.0	17	92.0
75	28	97.1	14	98.3	3	98.0	17	98.2
76	17	99.1	2	99.4	2	100.0	4	99.6
77	6	99.8						
78	1	99.9						
79	1	100.0	1	100.0			1	100.0
Total	869		173		101		274	

NOTE: Data are from September 1973 to April 1974.

[a]This is the point of greatest difference between the cumulative distribution of the sample of officers and of assaulted officers. The difference is not statistically significant at the 0.10 level.

[b]This is the point of greatest difference between the cumulative distribution of officers injured and of officers assaulted but not injured. The difference is not statistically significant at the 0.10 level.

CONCLUSION: Shorter officers are no more or less likely to be assaulted or injured than are taller officers.

The Relationship Among Height, Rank and Assault Experience

Fewer ranked officers (i.e., sergeants and lieutenants) than unranked officers were shorter than 69 inches; 20 percent of the sergeants, 13 percent of the lieutenants, and 32 percent of the unranked officers were shorter than 69 inches. This difference in height is statistically significant (see Table 40).

Sergeants were much less likely to be assaulted than were unranked officers. There were 341 people who assaulted unranked officers and only 13 who assaulted sergeants. The type of weapon used in these assaults and the frequency of injuries to unranked officers and sergeants are shown in Table 41. (Because there was only one assault among the 63 lieutenants, the sample size was too small to include in this analysis or in Table 41.)

Detailed data on 249 assaults were provided by Dade County (see Appendix B). The distributions of the heights of a sample of all officers (including ranked and unranked officers) and of a sample of assaulted officers are shown in Table 42. There was no significant difference in the two distributions, which leads to a conclusion that height did not have any influence on the likelihood of an officer being assaulted in Dade County.

The Relationship Between Height and Other Characteristics of Assaults

Thirteen general characteristics of the assaults were examined to determine whether short officers were more or less prone to involvement in different types of assaults. Significant relationships with the height of the assaulted officer would be expected between one and two times (using independent tests of significance). The following two differences were statistically significant:

- assailants of taller officers were more likely to be intoxicated,
- assaults on shorter officers tended to occur more often when the officer was alone.

No statistically significant relationships were found between an officer's height and the following characteristics:

- age of assailant(s),
- race of assailant(s),
- sex of assailant(s),

Table 40

HEIGHTS OF OFFICERS, SERGEANTS, AND LIEUTENANTS IN DADE COUNTY

HEIGHT (Inches)	CUMULATIVE PERCENT BY HEIGHT		
	Unranked Officers[a]	Sergeants[b]	Lieutenants[c]
62	0.1	0.0	
63	0.2	0.5	
64	0.8	1.4	
65	1.2	2.4	
66	2.0	2.9	
67	7.8	3.3	0.0
68	18.6	6.7	4.8
69	31.6	20.0	12.7[d]
70	47.6	31.4[e]	34.9
71	64.3	55.2	66.7
72	80.3	71.0	79.4
73	87.3	82.9	88.9
74	93.9	91.0	96.8
75	97.1	96.2	98.4
76	99.1	98.1	100.0
77	99.8	99.5	
78	99.9	100.0	
79	100.0		

NOTE: Data are from September 1973 to April 1974.

a
N = 869.

b
N = 210.

c
N = 63.

d
This is the greatest difference between the cumulative percent of lieutenants and of unranked officers. The difference is statistically significant at the 0.10 level of significance.

e
This is the greatest difference between the cumulative percent of sergeants and of unranked officers. The difference is statistically significant at the 0.001 level of significance.

CONCLUSION: A much smaller percent of sergeants and lieutenants than of officers are shorter than 69 inches tall.

Table 41

WEAPONS USED BY ASSAILANTS AND INJURIES TO OFFICERS AND SERGEANTS IN DADE COUNTY

WEAPON USED BY ASSAILANT(S)	NUMBER OF ASSAILANTS	PERCENT OF ASSAULTS RESULTING IN INJURY
Assaults on Unranked Officers		
Hands, feet, fists, teeth, bodily force	274	63.2
Firearm	17	17.6
Club	7	85.7
Cutting or stabbing instrument	6	16.7
Other	37	37.8
All weapon types	341	57.8
Assaults on Sergeants[a]		
Hands, feet, fists, teeth, bodily force	8	37.5
Firearm	1	--
Club	0	--
Cutting or stabbing instrument	1	--
Other	3	--
All weapon types	13	38.5

NOTE: Data are from September 1973 to April 1974.

[a] Only one incident involving a lieutenant was reported.

Table 42

ALL TYPES OF ASSAULTS ON OFFICERS AND OFFICIALS
OF DIFFERENT HEIGHTS IN DADE COUNTY

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	All Officers or Officials	Assaulted Officers and Officials	All Officers or Officials	Assaulted Officers and Officials	
62	1		0.1		
63	1	1	0.2	0.4	-0.2
64	5	1	0.8	0.8	0.0
65	3		1.2		
66	7	1	2.0	1.2	0.8
67	51	13	7.8	6.4	1.4
68	94	31	18.6	18.9	-0.3
69	113	25	31.6	28.9	2.7[a]
70	139	43	47.6	46.2	1.4
71	145	47	64.3	65.1	-0.8
72	139	34	80.3	78.7	1.6
73	61	19	87.3	86.3	1.0
74	57	18	93.9	93.6	0.3
75	28	12	97.1	98.4	-1.3
76	17	3	99.1	99.6	-0.5
77	6	0	99.8		
78	1	0	99.9		
79	1	1	100.0	100.0	
All heights	869	249[b]			

NOTE: Data are from September 1973 to April 1974.

a
This is the greatest difference in the cumulative percent of all officers and officials and of assaulted officers and officials. The difference is not statistically significant even at the 0.20 level.

b
Data on four assaults were missing.

- number of assailants in an incident,
- type of weapon used or threatened by assailant,
- whether the identity of assailant was known to officer,
- type of weapon used by officer,
- officer's activity (making arrest, etc.),
- whether officer was injured by the assault,
- type of weapon causing an injury to officer,
- whether there were injuries to more than just officer assaulted.

The above results are summarized in Table 43.

Data on the characteristics of assailants are shown in Table 44. Assailants were most likely to be males who were less than 30 years old, and who were acting alone. Just over half of the assailants were black. The weapon most commonly used by assailants was a part of the body. Almost all assailants were not previously known to the officer they attacked. These characteristics, along with the percent of assaults made by intoxicated people, are shown in Table 45. As shown in Table 46, intoxicated assailants were more likely to assault taller officers than shorter officers.

As shown in Table 47, the majority of the assaults occurred in incidents in which the officer was attempting an arrest. In about half the cases the officer reportedly did not use a weapon. In 14 percent of the cases the officer was assaulted when no other officer was present; the percentage is higher (21%) for shorter officers, as shown in Table 48.

The chances of a second officer being assaulted do not seem to be influenced by the height of the first officer assaulted, as indicated in Table 49. The majority of assaults in Dade County resulted in an injury to the officer, and the injuries were most often due to the assailant's use of bodily force.

OAKLAND

The Police Department for the city of Oakland, California, provided data on "negative encounters" between officers and citizens that resulted in a charge of resisting arrest, or assault on an officer, or in an officially recorded negative interaction between police and citizens. The data covered a 3.8 year period from January 1, 1970 through October 31, 1973. In addition to negative encounters, the data included all on-duty injuries for vehicular and industrial accidents. The sample sizes for the Oakland data are summarized in Table 50.

Table 43

SUMMARY OF AN ANALYSIS OF THE CHARACTERISTICS OF ASSAULTS AND THEIR RELATIONSHIP TO AN OFFICER'S HEIGHT IN DADE COUNTY

CHARACTERISTIC OF ASSAULT	IS THERE ANY STATISTICALLY SIGNIFICANT RELATIONSHIP WITH THE HEIGHT OF THE OFFICER ASSAULTED?[a]
Assailant characteristics	
Age	No
Race	No
Sex	No
Number per incident	No
Type of weapon threatened or used	No
Condition (intoxicated, normal, etc.)	Yes
Identity known by officer prior to assault	No
Officer's actions	
Weapon used or not	No
Activity (arrests, other)	No
Other officers present or not	Yes
Injuries	
Officer injured or not	No
Type of weapon causing injury to officer	No
Injuries other than to officer	No

NOTE: Data are from September 1973 to April 1974.

[a] At the 0.10 level.

Table 44

CHARACTERISTICS OF PEOPLE WHO ASSAULTED POLICE IN DADE COUNTY

ASSAILANT CHARACTERISTICS	(%)	(N)	IS THERE A STATISTICALLY SIGNIFICANT RELATIONSHIP WITH HEIGHT?[a]
Age(s) of assailant(s)			
13 - 19 years	31	85	
20 - 30	39	106	No
Over 30	30	80	
Total	100	271[b]	
Race(s) of assailant(s)			
Caucasian	54	134	
Black	46	113	No
Total	100	247[b]	
Sex(es) of assailant(s)			
Male	82	213	
Female	18	46	No
Total	100	259[b]	
Number of assailants per incident			
One	86	215	
Two	9	22	No
Over two	5	12	
Total	100	249[b]	

NOTE: Data are from September 1973 to April 1974

[a] At the 0.10 level.

[b] Excluding missing data; counting the number of assailants, which sometimes is more than one per assault.

Table 45

CHARACTERISTICS OF ASSAULTS IN DADE COUNTY

CHARACTERISTIC	(%)	(N)	IS THERE A STATISTICALLY SIGNIFICANT RELATIONSHIP WITH HEIGHT?[a]
Weapon used or threatened			
Hands, fists, feet, bodily force	73	194	
Firearm	5	14	
Cutting instrument	3	9	No
Other Weapon	18	48	
Total	100	265[b]	
Condition(s) of assailant(s)			
Normal	71	179	
Intoxicated		58	
High on drugs		6	Yes[c]
Mentally impaired	29	7	
None of these	—	1	
Total	100	251[b]	
Identity of assailant known by officer prior to assault			
Yes	4	11	
No	96	238	No
Total	100	249[b]	

NOTE: Data are from September 1973 to April 1974.

a
At the 0.10 level.

b
Excludes missing data.

c
Even at the 0.01 level.

Table 46

ASSAULTS BY INTOXICATED OR MENTALLY IMPAIRED PEOPLE ON POLICE OF DIFFERENT HEIGHTS IN DADE COUNTY

HEIGHT (Inches)	ASSAULTS, BY CONDITION OF ASSAILANT					
	Normal		Intoxicated, High on Drugs, Mentally Impaired, and Other[a]		Total	
	(%)	(N)	(%)	(N)	(%)	(N)
69 and under	75	55	25	18	100	73
70 - 73	73	105	27	39	100	144
74 and over	56	19	44	15	100	34
All heights	71	179	29	72	100	251

NOTE: Data are from September 1973 to April 1974.

[a] Intoxicated only, N = 58.

CONCLUSION: Assaults on tall officers are more likely to involve an intoxicated assailant (chi-square = 4.72, probability = 0.095).

Table 47

ACTIVITY OF OFFICERS AT TIME OF ASSAULT IN DADE COUNTY

TYPE OF ACTIVITY	(%)	(N)	IS THERE A STATISTICALLY SIGNIFICANT RELATIONSHIP WITH HEIGHT?[a]
Was a weapon used by the officer?			
Yes	58	144	
No	42	105	No
Total assaults	100	249[b]	
Was an arrest being attempted?			
Yes	61	151	
No	39	98	No
Total assaults	100	249[b]	
Were other officers present?			
Yes	86	201	
No	14	33	Yes
Total assaults	100	234[b]	

NOTE: Data are from September 1973 to April 1974.

[a] At the 0.10 level.

[b] Excluding missing data.

Table 48

PRESENCE OF OTHER OFFICERS DURING ASSAULTS ON OFFICERS OF DIFFERENT HEIGHTS IN DADE COUNTY

HEIGHT (Inches)	Other Officer Present (%)	(N)	No Other Officer Present (%)	(N)	Total (%)	(N)
69 and under	79	55	21	15	100	70
70 - 73	90	120	10	13	100	133
74 and over	84	26	16	5	100	31
All heights	86	201	14	33	100	234[a]

NOTE: Data are from September 1973 to April 1974.

[a] Excluding missing data.

CONCLUSION: A slightly larger fraction of assaults on shorter officers occurred when no other officer was present (chi-square = 5.23, probability = 0.07).

Table 49

SUMMARY OF TYPES OF INJURIES IN DADE COUNTY

STATUS OF INJURIES	(%)	(N)	IS THERE A STATISTICALLY SIGNIFICANT RELATIONSHIP WITH HEIGHT?[a]
Was assaulted officer injured?			
Yes	57	143	
No	43	106	No
Total assaults	100	249[b]	
Cause of injury to officer			
Hands, fists, feet, bodily force	64	116	
Other weapon	36	65	No
Total use of weapons	100	181[b]	
Were there injuries to other than the assaulted officer?			
None	80	201	
Officer's partner	19	24	
Other officer		24	No
Citizen	1	2	
Total	100	251[b]	

NOTE: Data are from September 1973 to April 1974.

[a] At the 0.10 level.

[b] Counting multiple occurrences and excluding missing data.

Table 50

SUMMARY OF OAKLAND, CALIFORNIA POLICE DEPARTMENT DATA

TYPES OF DATA	TOTAL SAMPLE SIZE	SAMPLE SIZE FOR THE BUREAU OF FIELD OPERATIONS (PATROL, TRAFFIC & SPECIAL OPERATIONS)
Number of Officers	892	---
Man-Months Worked	30,279	---
Officers Having Encounters	693	638
Negative Encounters	12,437	11,075
Encounter Injuries to Citizens	853	756
Encounter Injuries to Officers	8,605	7,552
Officers with Encounter Injuries	626	563
Industrial Injuries to Officers	864	---
Officers with Industrial Injuries	441	---
Vehicular Accidents	682	---
Officers with Vehicular Accidents	367	---

NOTE: Data are from January 1, 1970 through October 31, 1972.

The Oakland data failed to provide a directly comparable group with which to compare the performance of the shorter police officers since shorter officers had less seniority than taller officers. Officers who were 5 feet 7 inches tall were working an average of 47 percent of the time during the sample period, and 56 percent for officers 5 feet 8 inches, as compared to the department average of 73 percent.[15] This trend reflects the history of height requirements in the department. In July 1968 the minimum height requirement was dropped to 5 feet 8 inches, and in July 1970 the requirement dropped to 5 feet 7 inches. Shorter officers were more likely to have joined the force during the sample period and therefore to have been present for a lower percent of the time during the sample period.

Because of the seniority differences, few clear inferences can be drawn from the Oakland data. For example, while it is unclear what meaning should be attached to them, the following statistical findings can be noted: (1) officers who were 5 feet 8 inches or shorter (shorter officers) had twice as many negative encounters with citizens as did taller officers, (2) shorter officers were more frequently injured than taller officers, (3) officers who were 5 feet 9 inches tall--and were therefore eligible to join the department at any time during the study period--had more negative encounters than taller officers, and (4) officers who were 5 feet 8 inches or shorter were more likely than taller officers to be involved in vehicular accidents.

If one accepts "negative encounters" as a measure of risk rather than as a performance measure, then one would be most interested in the frequency with which officers sustained injuries per negative encounter. By this measure, shorter officers were no more or less injury-prone than taller officers. (Shorter officers sustained fewer injuries per negative encounter, but the difference just missed being statistically significant at the 0.10 level, with the probability being 0.11.)

There was no statistically significant relationship between officers' heights and the number of industrial injuries. Considering only officers who were 69 inches or taller--and were eligible to join the department during the entire study period--there was no relationship between height and vehicular accidents.

Negative Encounters per Officer Man-Month

During the 3.8 year study period, shorter officers (5 feet 8 inches or shorter) were involved in more negative encounters per man-month than taller officers. However, the taller officers included supervisors, managers, and a larger number of experienced patrol officers.

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15 Data on man-months worked during the sample period are summarized in Figure 2.

The exposure to negative encounters may have been greater for the short officers for the following three reasons:

- the duties of supervisory and management personnel (all of whom were "tall") involved a reduced probability of involvement in citizen officer conflicts;
- taller officers were more experienced and may have been better able to avoid unnecessary encounters or to avoid having official records made of those encounters;
- taller officers were more experienced and may have been somewhat more likely to receive low-risk assignments (e.g., station or traffic duty).

The number of negative encounters per man-month for officers of different heights is shown in Table 51. Officers shorter than 69 inches had almost twice as many negative encounters per man-month as other officers. How much of this difference was due to height alone (as compared to type of assignment and years of experience) cannot be determined from Oakland's computerized data base.

The relationship between height and encounters per man-month is statistically significant. Figure 2 shows the expected change by hypothetically excluding shorter officers. The computed impact was far larger than what could be attributed to chance alone. Figure 2 indicates that by eliminating officers who were 68 inches or shorter (and eliminating the assaults on these officers) the average number of encounters per man-month would have dropped about five percent. It further shows that officers in the Oakland Police Department who were 68 inches or shorter worked five percent of the man-months during the sample period. Moreover, according to the figure, the elimination of all officers who were 71 inches or shorter would have excluded half the man-months and would have reduced the rate of negative encounters by more than ten percent.

Another method of analyzing the same data is to exclude from the sample officers shorter than 69 inches, because these officers were not eligible to join the department during the entire sample period. Figure 3 shows that even for this restricted group the taller officers worked more months during the sample period--indicating that taller officers were likely to have greater seniority than shorter officers. The taller (more experienced) the officers, the fewer negative encounters they had. Table 52 shows that, of the officers 69 inches and above, 49 percent of the man-months worked were worked by officers shorter than 6 feet, but 54 percent of the encounters involved officers under 6 feet. This difference in percentages is statistically significant.

Injuries and Negative Encounters

In this section of the paper, the number of encounters in which an officer was involved will be used as an estimate of risk of injury

Table 51

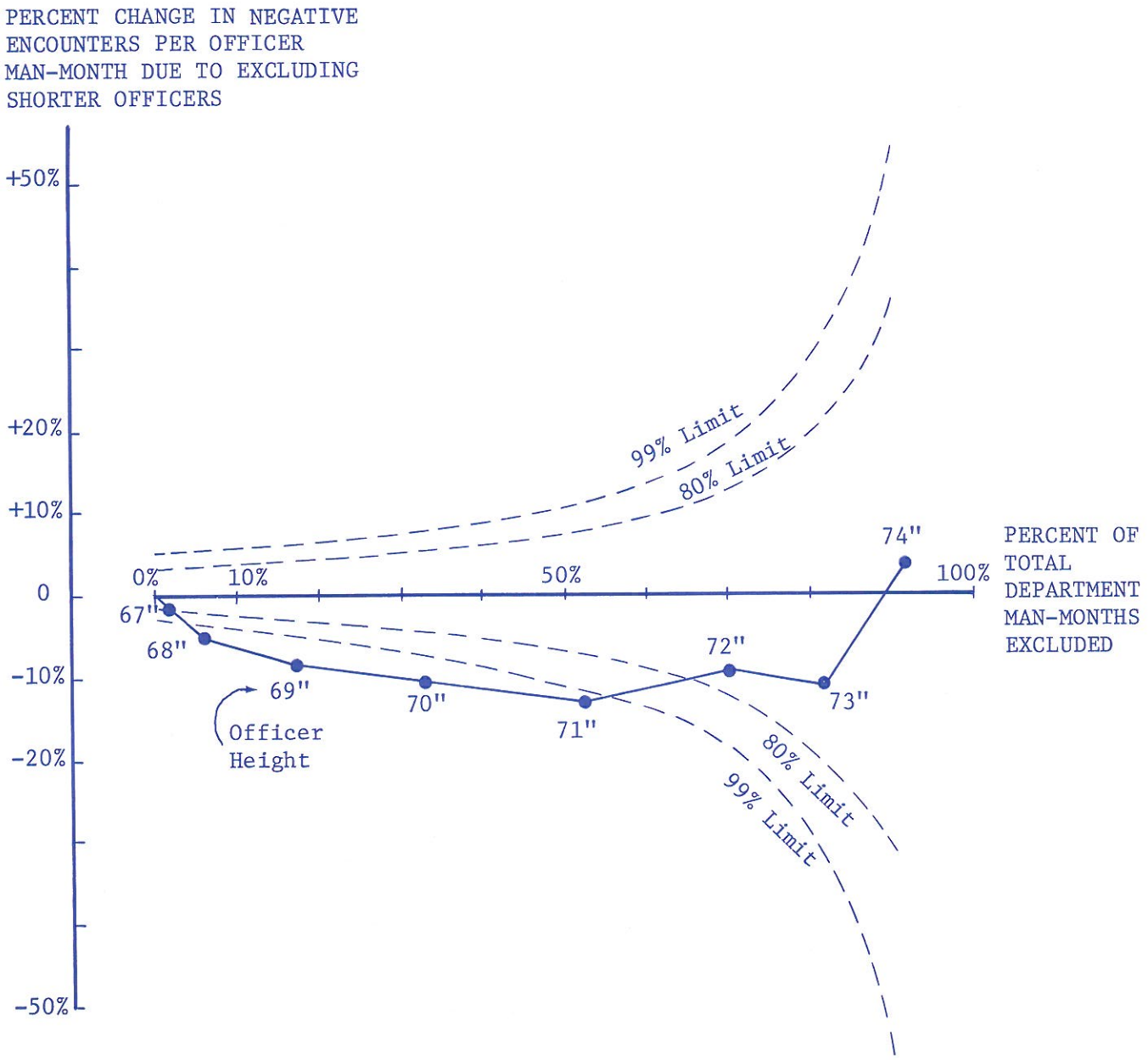
MONTHS WORKED AND NUMBERS OF ENCOUNTERS FOR OFFICERS OF DIFFERENT HEIGHTS IN OAKLAND

HEIGHT (Inches)	OFFICERS IN DEPT.	MAN-MONTHS WORKED	AVERAGE MAN-MONTHS WORKED PER OFFICER	NEGATIVE ENCOUNTERS		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
				Number	Per Man-Month Worked	Man-Months Worked[a]	Encounters	
67	16	347	22	249	0.72	1.1	2.0	-0.9
68	52	1,335	26	1,019	0.76	5.5	10.2	-4.7
69	108	3,650	34	1,818	0.50	17.6	24.8	-7.2[b]
70	143	4,846	34	1,920	0.40	33.6	40.3	-6.7
71	153	5,555	36	2,292	0.41	52.1	58.7	-6.6
72	164	5,481	33	1,779	0.32	70.1	73.0	-2.9
73	95	3,412	36	1,294	0.38	81.3	83.4	-2.1
74	88	3,115	35	978	0.31	91.6	91.3	0.3
75	73	2,538	35	1,088	0.43	100.0	100.0	0.0
Total	892	30,279	34	12,437	0.41			

NOTE: Data are from January 1, 1970 to October 31, 1973.

[a] During the sample period of 46 months.

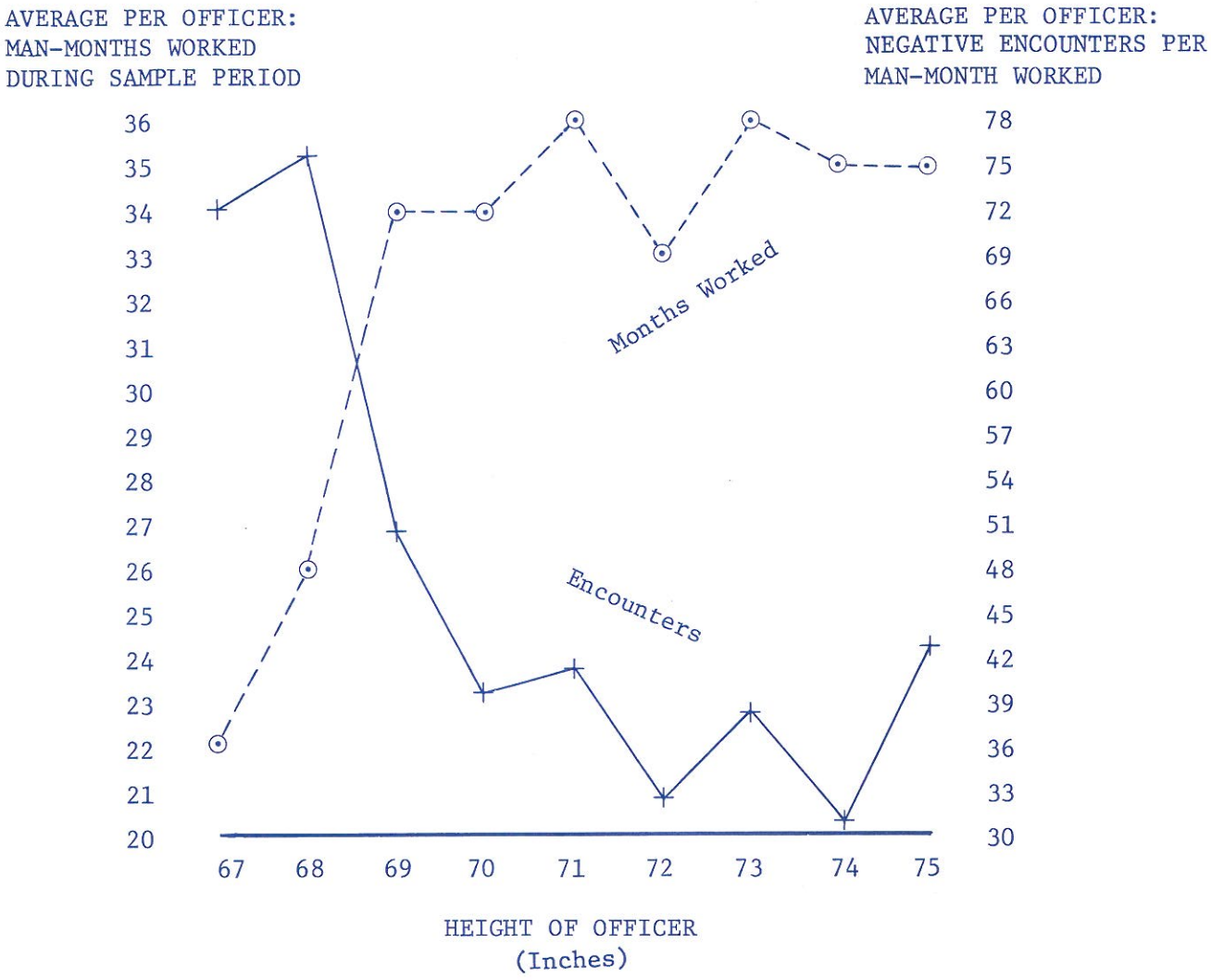
[b] This is the point of greatest difference between the cumulative percents of man-months worked and of encounters. The difference is statistically significant at the 0.001 level. However, the difference could be caused by the difference in the seniority of taller and shorter officers.



NOTE: Number of man-months = 30,279; this number is for all 892 officers between Jan. 1, 1970 and Oct. 31, 1973. The number of negative encounters = 12,437; this number is for all negative interactions between an officer and a citizen resulting in "Resisting Arrest" or a similar charge. Confience limits on this figure indicate the probability that the entire solid curve would fall within the limits shown by the dotted lines.

Figure 2

CHANGE IN NEGATIVE ENCOUNTERS PER OFFICER MAN-MONTH DUE TO HYPOTHETICALLY EXCLUDING SHORTER OFFICERS IN OAKLAND, CALIFORNIA



NOTE: Data are from January 1970 to October 1973.

Figure 3

HEIGHT, MAN-MONTHS WORKED, AND NEGATIVE ENCOUNTERS PER MAN-MONTH IN OAKLAND, CALIFORNIA

Table 52

ANALYSIS OF ENCOUNTERS OF OAKLAND OFFICERS OVER 68 INCHES TALL

HEIGHT (Inches)	CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Man-Months Worked[a]	Negative Encounters[b]	
69	12.7	16.3	-3.6
70	29.6	33.5	-3.9
71	49.0	54.0	-5.0[c]
72	68.2	70.0	-1.8
73	80.1	81.5	-1.4
74	90.9	90.3	0.6
75	100.0	100.0	0.0

NOTE: Data are from January 1970 to October 1973.

a
N = 28,597; 824 officers.

b
N = 11,169.

c
This is the point of greatest difference between the cumulative percent of man-months worked and of encounters. The difference is statistically significant at the 0.05 level of significance. Officers who were at most 71 inches tall had somewhat more negative encounters than did the taller officers.

For the purpose of this discussion, it is assumed that officers may have some control over the number of injuries during the negative encounters in which they become involved. This procedure of examining the number of injuries per encounter seems to be a logical way of trying to control somewhat for the great disparity that was found in the experiment involving the shorter and taller officers.

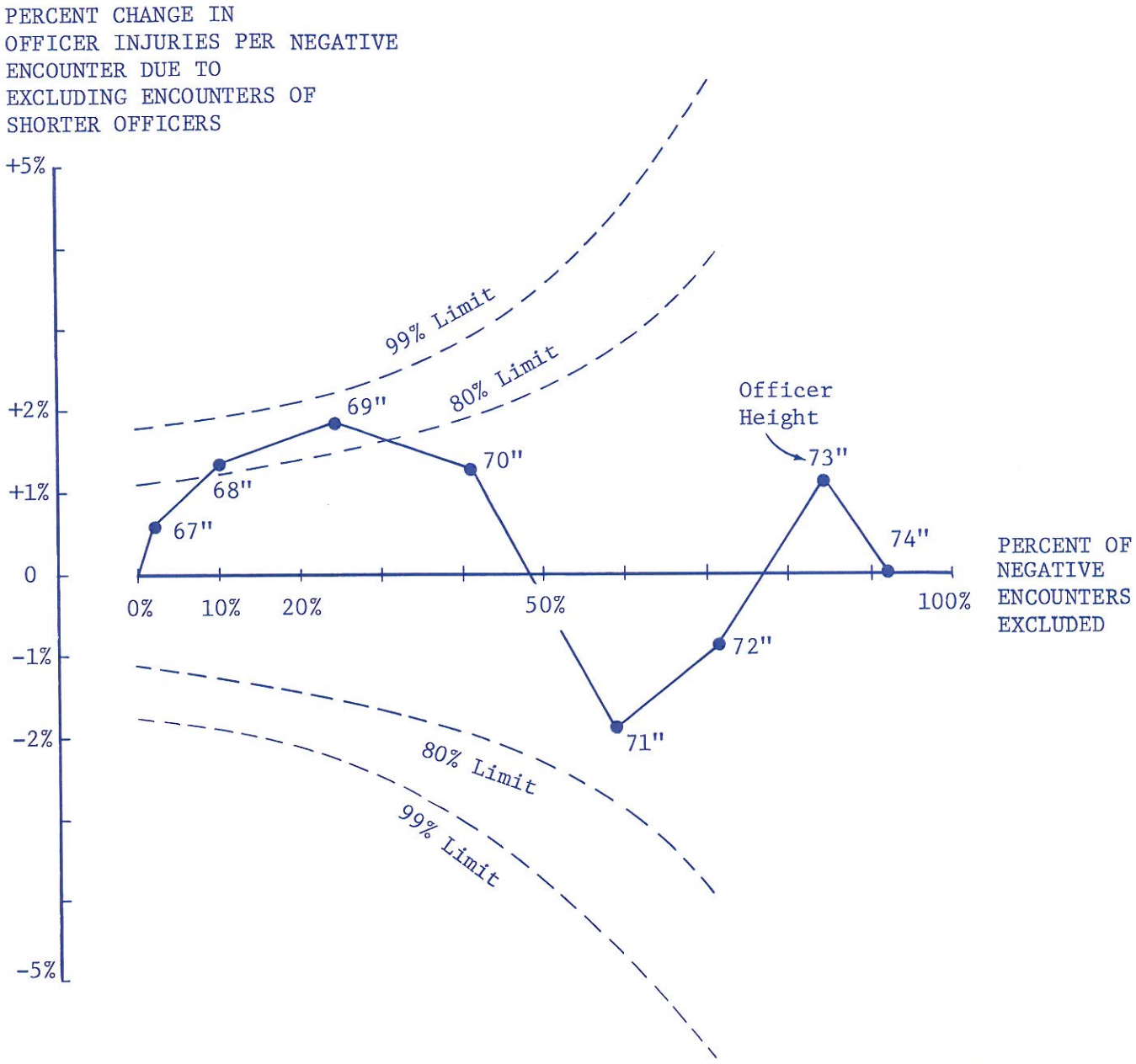
The effect of eliminating shorter officers on injuries per encounter is shown in Figures 4 and 5. Figure 4 shows the effect on officer injuries and Figure 5 shows the effect on citizen injuries. Eliminating shorter officers slightly increased officer injuries per encounter; however, the observed trend was not statistically significant (probability = 0.11). The reported number of civilians injured was too small to observe any trends.

The number of injuries per incident for officers of different heights is shown in Table 53. The number of officer injuries was about 10 times as great as citizen injuries.

Two trends have been observed: shorter officers were involved in more encounters per man-month, but in fewer injuries per encounter. The net effect on shorter officers was that they had a higher rate of injuries per man-month (as is illustrated in Figure 6). The height-injury relationship is statistically significant (as shown in Table 54), but the small difference (less than 0.1 encounters per man-month worked) due to height may have resulted from the lesser experience of the shorter officers.

Industrial Injuries and Vehicular Accidents

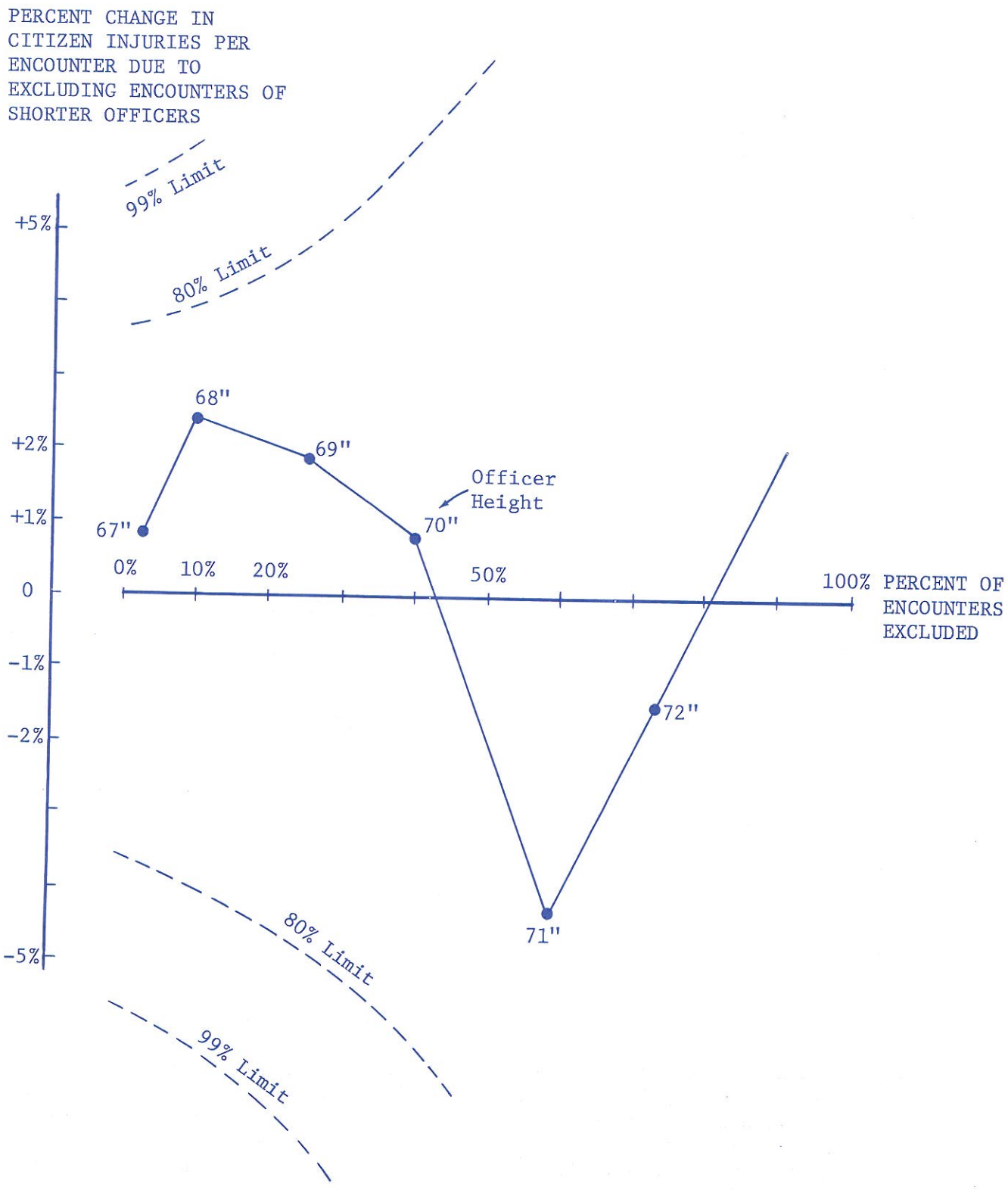
Officers in Oakland had 0.023 vehicular accidents per man-month and 0.029 industrial injuries per man-month. No statistically significant relationship was found between height and industrial injuries. There was a statistically significant relationship between height and vehicular accidents--shorter officers were more frequently involved in vehicular accidents.



NOTE: Number of negative encounters = 12,437; this number is for all officers between Jan. 1, 1970 and Oct. 31, 1973. Number of injuries = 8,605; this number is for injuries sustained by officers in the encounters. Confidence limits on this figure indicate the probability that the entire solid curve would fall within the limits shown by the dotted lines. The solid curve on this figure would be expected to occur by chance alone 11 times out of 100.

Figure 4

CHANGE IN OFFICER INJURIES PER ENCOUNTER DUE TO HYPOTHETICALLY EXCLUDING ENCOUNTERS OF SHORTER OFFICERS IN OAKLAND, CALIFORNIA



NOTE: Confidence limits on this figure indicate the probability that the entire solid curve would fall within the limits shown by the dotted lines.

Figure 5

CHANGE IN CITIZEN INJURIES PER ENCOUNTER DUE TO HYPOTHETICALLY EXCLUDING ENCOUNTERS OF SHORTER OFFICERS IN OAKLAND, CALIFORNIA

Table 53

ENCOUNTERS AND INJURIES FOR OFFICERS OF DIFFERENT HEIGHTS IN OAKLAND

HEIGHT (Inches)	NEGATIVE ENCOUNTERS	INJURIES FROM ENCOUNTERS		CUMULATIVE PERCENT OF ENCOUNTERS	CUMULATIVE PERCENT ENCOUNTER INJURIES		INJURIES PER ENCOUNTER	
		Officer Injuries	Citizen Injuries		Officer Injuries	Citizen Injuries	Officer Injuries	Citizen Injuries
67	249	123	11	2.0	1.4	1.3	0.49	0.04
68	1,019	648	57	10.2	9.0	8.0	0.64	0.06
69	1,818	1,247	132	24.8	23.5[a]	23.4	0.69	0.07
70	1,920	1,383	132	40.3	39.5	38.9	0.72	0.07
71	2,292	1,718	184	58.7	59.5	60.5	0.75	0.08
72	1,779	1,179	110	73.0	73.2	73.4	0.66	0.06
73	1,294	865	63	83.4	83.2	80.8	0.67	0.05
74	978	693	67	91.3	91.3	88.6[b]	0.71	0.07
75	1,088	749	97	100.0	100.0	100.0	0.69	0.09
Total	12,437	8,605	853				0.69	0.07

NOTE: Data are from January 1, 1970 to October 31, 1973.

[a]This is the point of greatest difference between the cumulative percent of encounters and cumulative percent of officer injuries. The difference is not statistically significant at the 0.10 level (probability = 0.11).

[b]This is the point of greatest difference between the cumulative percent of encounters and cumulative percent of citizen injuries. The difference is not statistically significant, even at the 0.20 level of significance.

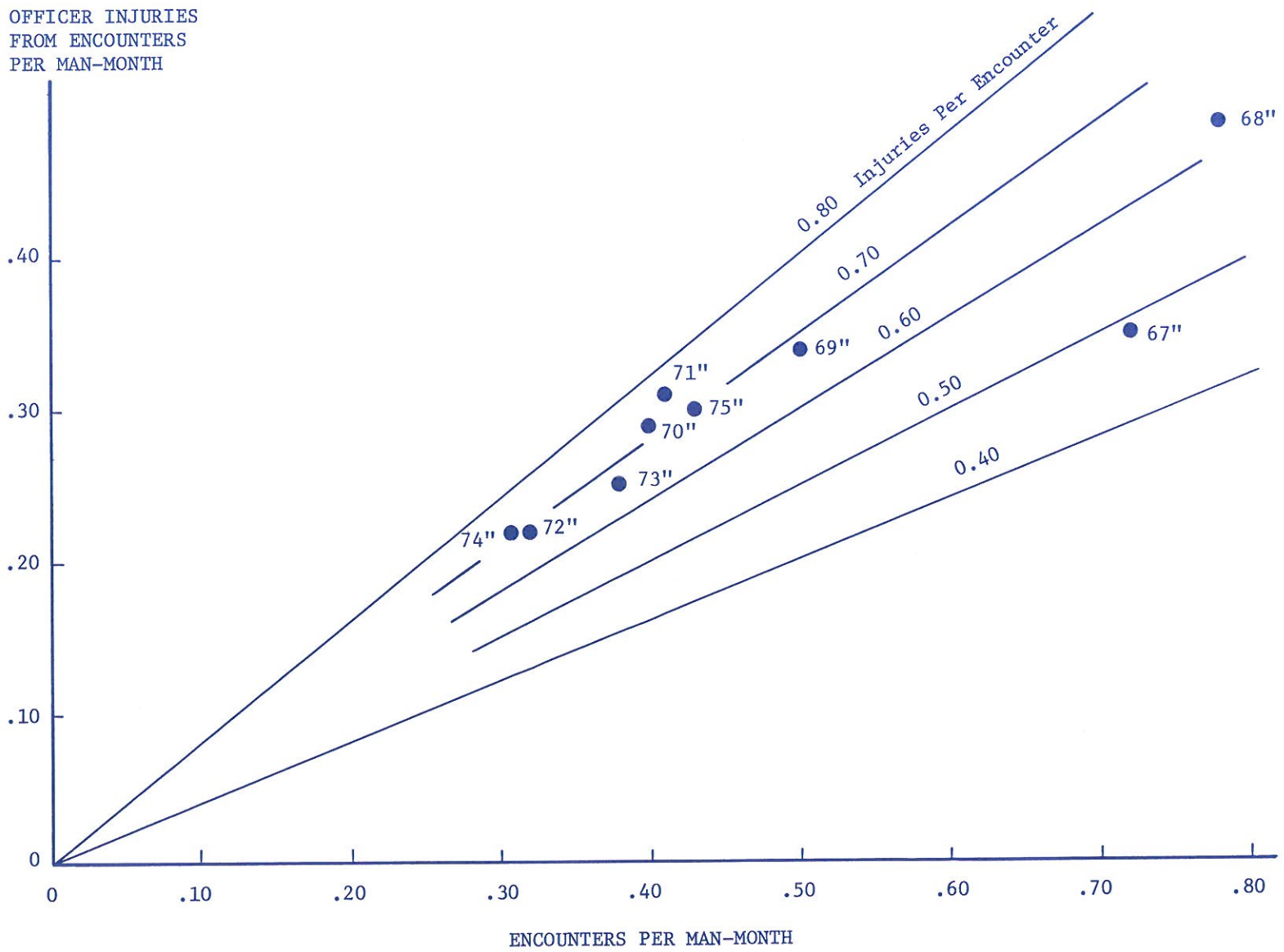


Figure 6

HEIGHT, ENCOUNTERS, AND INJURIES IN OAKLAND, CALIFORNIA

Table 54

OFFICER INJURIES DUE TO ENCOUNTERS AND HEIGHT IN OAKLAND

HEIGHT (Inches)	OFFICER INJURIES FROM ENCOUNTERS PER MONTH WORKED	CUMULATIVE PERCENT OF MONTHS WORKED	CUMULATIVE PERCENT OF INJURIES TO OFFICERS
67	123/347 = 0.35	1.1	1.4
68	648/1,335 = 0.49	5.5	9.0
69	1,247/3,650 = 0.34	17.6	23.5
70	1,383/4,846 = 0.29	33.6	39.5
71	1,718/5,555 = 0.31	52.1	59.5[a]
72	1,179/5,481 = 0.22	70.1	73.2
73	865/3,412 = 0.25	83.1	83.2
74	693/3,115 = 0.22	91.6	91.3
75	749/2,538 = 0.30	100.0	100.0
Total	8,605/30,279 = 0.28		

a
This is the greatest difference between the cumulative percent of months worked and cumulative percent of injuries to officers. The difference is statistically significant at the 0.001 level of significance.

The data for industrial injuries and vehicular accidents are shown in Tables 55 and 56. If officers under 69 inches (who were eligible to join the department only during the latter part of the sample period) were excluded, there was no statistically significant relationship between height and vehicular accidents (even at the .2 level of significance).

Table 55

INDUSTRIAL INJURIES TO POLICE IN OAKLAND

HEIGHT (Inches)	INDUSTRIAL INJURIES PER MAN-MONTH	CUMULATIVE PERCENT	
		Man-Months Worked	Industrial Injuries
67	13/347 = 0.037	1.1	1.5
68	42/1,335 = 0.031	5.5	6.4
69	111/3,650 = 0.030	17.6	19.2[a]
70	131/4,846 = 0.027	33.6	34.4
71	161/5,555 = 0.029	52.1	53.0
72	145/5,481 = 0.026	70.1	69.8
73	107/3,412 = 0.031	81.3	82.2
74	72/3,115 = 0.023	91.6	90.5
75	82/2,538 = 0.032	100.0	100.0
Total	864/30,279 = .029		

[a] This is the point of greatest difference between the cumulative percent of months worked and of industrial injuries. The difference is not statistically significant, even at the 0.2 level of significance.

Table 56

VEHICULAR ACCIDENTS IN THE OAKLAND POLICE DEPARTMENT

HEIGHT (Inches)	VEHICULAR ACCIDENTS PER MAN-MONTH	CUMULATIVE PERCENT		CUMULATIVE PERCENTS EXCLUDING OFFICERS SHORTER THAN 69 INCHES	
		Months Worked	Vehicular Accidents	Months Worked	Vehicular Accidents
67	15/347 = 0.043	1.1	2.2		
68	42/1,335 = 0.031	5.5	8.4		
69	95/3,650 = 0.026	17.6	22.3[a]	12.8	15.2
70	95/4,846 = 0.020	33.6	36.2	29.7	30.3
71	120/5,555 = 0.022	52.1	53.8	49.3	49.6
72	98/5,481 = 0.018	70.1	68.2	68.3	65.3[b]
73	93/3,412 = 0.027	81.3	81.8	80.2	80.1
74	68/3,115 = 0.022	91.6	91.6	91.1	90.8
75	56/2,538 = 0.022	100.0	100.0	100.0	100.0
Total	682/30,279 = 0.023				

a
This is the greatest difference in the cumulative percents of man-months worked and vehicular accidents. The difference is statistically significant at the 0.02 level of significance.

b
This is the greatest difference in the cumulative percents of man-months worked and of vehicular accidents, considering only officers who are at least 5 feet 9 inches tall. The difference is not statistically significant, even at the 0.20 level of significance.

APPENDIX A

STATISTICAL METHODOLOGY

STATISTICAL METHODOLOGY

Two statistical techniques were used: the Kolmogorov-Smirnov Two-Sample Test, and chi-square test.[16]

In cases where data could be displayed by one-inch height intervals, a Kolmogorov-Smirnov test was used to compare the cumulative percentage of the observations in each of two categories. This test is sensitive to any kind of difference in the distributions from which the two samples are drawn. The Kolmogorov-Smirnov test was used for the following three reasons:

- heights do not have to be partitioned into categories, which are always somewhat arbitrary;
- when compared to a t-test, the Kolmogorov-Smirnov test is highly efficient (about 96%),[17] and it also is more powerful than a chi-square test;
- the Kolmogorov-Smirnov procedure permits computation of the statistical significance of the estimated impact of dropping officers who are below a given height.

To use this test, compare the X_i percent of officers who were less than or equal to h_i inches tall and the Y_i percent of the assaults that were made on officers h_i inches tall or less. A height h_i is found that produces the largest absolute differences between X_i and Y_i, and the largest difference $\max |X_i - Y_i|$ is used to accept or reject the hypothesis that the two samples, assumed independent, were drawn from the same distribution of heights. At the 0.10 level of significance, the hypothesis is rejected if:

$$\max \left| X_i - Y_i \right| > 122 \sqrt{\frac{N_1 + N_2}{N_1 N_2}}$$

where N_1 and N_2 are the number of observations in each of the two samples.

---

16 See S. Siegel, Nonparametric Statistics for the Behavioral Sciences.

17 Ibid., p. 136.

When data were arranged in groups with greater than one-inch intervals in tables where the row percentages added to 100 percent, a chi-square test for k independent samples was used (k is the number of categories represented in the rows of the table). The hypothesis being tested was that the percent of observations in each column was the same for every row. If the chi-square value computed was large enough, the hypothesis was rejected at the 0.10 level of significance. (Chi-square tests must be performed on frequencies of observations and not on percentage distributions, as has sometimes been done in previous police studies.) In none of the chi-square tests were any of the possible modifications used, such as the correction for continuity or Fisher's exact probability test.

The sensitivity of various rates (assault, injury, etc.) to height was sometimes examined by computing the percent change in the rate that could be expected by excluding all officers under a height h_i. By excluding the X_i percent of the shorter officers the resulting rate among the reaming officers differs from the rate for all officers by the percentage

$$\left(\frac{X_i - Y_i}{X_i} \right) 100\%$$

which can be computed as a curve for various values of X_i. Under the hypothesis that there is no systematic height effect, the observed curve should be entirely contained in the following limits with a 90 percent confidence for all values $0 \leq X_i \leq 100\ \%$:

$$-\frac{122}{X_i}\sqrt{\frac{N_i + N_2}{N_i N_2}} \leq \left(\frac{X_i - Y_i}{X_i} \right) 100\% \leq \frac{122}{X_i}\sqrt{\frac{N_1 + N_2}{N_1 N_2}}$$

The confidence limits are computed from the Kolmogovov-Smirnov test equation shown above by dividing through by X_i .

In addition, a search was made for patterns indicating a relationship between height and performance among multiple variables, using procedures that employed simple probability theory (these procedures are fully described in the text).

The results of all statistical tests performed by the investigators are presented in this report.

APPENDIX B

DATA COLLECTION FORM DESIGNED FOR THIS STUDY

Leave Blank ☐☐☐☐☐☐☐☐☐

INCIDENT DATA

INCIDENT ID NUMBER ☐☐☐☐☐☐☐☐

DATE OF INCIDENT ☐☐☐ HOUR OF DAY ☐☐ ☐AM ☐PM

Background of Incident

WEAPONS USED BY OFFICER ☐ none ☐ discharge firearms ☐ nightstick ☐ hand/foot ☐ other

ACTIVITY TYPE:
- ☐ responding to disturbance call
- ☐ attempting arrests (all types)
- ☐ handling prisoners
- ☐ traffic pursuits and stops
- ☐ all other

DUTY STATUS:
- ☐ on duty ☐ off duty
- ☐ uniform ☐ civil. clothes
- ☐ other officer present
- ☐ no other officer present

Assault Data

WAS OFFICER ASSAULTED
- ☐ yes
- ☐ no

NUMBER OF ASSAILANTS
- ☐ one
- ☐ two
- ☐ over two

WEAPONS USED/THREATENED BY ASSAILANT(S)
- ☐ hand, fist, feet, etc.
- ☐ firearm
- ☐ cutting instrument
- ☐ other

OFFICER ASSAULTED FROM
- ☐ front
- ☐ side
- ☐ rear

SNIPER/AMBUSH/TRAP
- ☐ yes
- ☐ no

AGE(S) OF ASSAILANT(S)
- ☐ 0-12
- ☐ 13-19
- ☐ 20-30
- ☐ over 30

SEX(ES) OF ASSAILANT(S)
- ☐ male
- ☐ female

ETHNIC BACKGROUND(S)
- ☐ caucasian
- ☐ black
- ☐ other

HEIGHT(S) OF ASSAILANT(S)
- ☐ under 5'
- ☐ 5' to 5'6"
- ☐ 5'7" to 5'9"
- ☐ 5'10" to 6'
- ☐ over 6'

BUILD(S) OF ASSAILANT(S)
- ☐ light
- ☐ medium
- ☐ heavy

IDENTITY OF ASSAILANT(S) KNOWN PRIOR TO ASSAULT
- ☐ yes
- ☐ no

CONDITION(S) OF ASSAILANT(S)
- ☐ normal
- ☐ intoxicated
- ☐ high on drugs
- ☐ mentally impaired
- ☐ none of these

Leave Blank ☐☐☐☐☐☐☐☐☐

Injury Data On Officer

WAS OFFICER INJURED
- ☐ yes
- ☐ no

HOW INJURED
- ☐ assault
- ☐ auto accident
- ☐ other

TYPE INJURY
- ☐ gunshot
- ☐ bite, kick, punch
- ☐ cut/stab
- ☐ other

DID INJURY CAUSE OFFICER TO MISS WORK DAYS
- ☐ none
- ☐ up to one
- ☐ 2 to 10
- ☐ more

DID INJURY CAUSE OFFICER TO WORK ON LIGHT DUTY
- ☐ none
- ☐ up to one
- ☐ 2 to 10
- ☐ more

WILL THE INJURY CAUSE PERMANENT DISABILITY OR DEATH
- ☐ yes
- ☐ no

Other Injury

INJURIES OTHER THAN OFFICER
☐ none ☐ officer's partner ☐ other officer ☐ citizen

URBAN INSTITUTE
HEIGHT STUDY DATA COLLECTION FORM

Leave Blank ☐☐☐☐☐☐☐☐☐

Survey Conditions

DATA ON THIS SHEET WAS DRAWN FROM A SURVEY OF:

Check One ☐ incidents and the officers involved ☐ officers

THE SURVEY CONSISTS OF ☐☐☐ (number of officers or incidents)

DRAWN FROM A TOTAL OF ☐☐☐☐☐ AVAILABLE FOR SURVEY

DURING THE TIME PERIOD ☐☐☐☐☐ THROUGH ☐☐☐☐☐

Officer Data Background

OFFICER IDENTIFICATION NUMBER ☐☐☐☐☐☐☐☐☐

YEAR OF BIRTH 19☐☐

YEAR JOINED DEPT. 19☐☐

HEIGHT (INCHES) ☐☐

WEIGHT (LBS.) ☐☐☐

SEX ☐ Male ☐ Female

EDUCATION, YEARS COMPLETED ☐☐

CIVIL SERVICE SCORE ☐☐☐

POLICE ACADEMY SCORE ☐☐☐

ETHNIC BACKGROUND ☐ Caucasian ☐ Black ☐ Mexican/Latin Am. ☐ Other

Leave Blank ☐☐☐☐☐☐☐☐☐

Activity During Sample

DURING THE TIME PERIOD ☐☐☐☐☐ TO ☐☐☐☐☐ THE OFFICER

☐ remained in department ☐ died

☐ resigned ☐ was dismissed

☐ retired ☐ left for other reasons

WAS CREDITED WITH (NUMBER OF)

☐☐☐ felony arrests

☐☐☐ non-felony arrests

☐☐☐ moving traffic citations without arrest

☐☐ dept. commendations

☐☐ total dept. complaints

☐☐ sustained citizen complaints

☐☐☐ days paid sick leave

☐☐☐ days paid injury leave

☐☐☐ days light duty

☐☐ days suspended/forfeited

☐☐ times assaulted

☐☐ times in auto accident

☐☐ times injured on duty

Questions? Call Collect
Tom White
The Urban Institute
202-223-1950 ext. 594

APPENDIX C

REVIEW OF THE LITERATURE

REVIEW OF THE LITERATURE

SAN DIEGO HEIGHT STUDY

Two documents were available for review:

- Raymond L. Hoobler, "Analysis of Minimum Height Requirements on the San Diego Police Department," memorandum to Kimball Moore, City Manager, City of San Diego, June 11, 1973.

- Raymond L. Hoobler and J. A. McQueeney, "A Question of Height," The Police Chief, November 1973.

Whenever possible, the published article was relied on rather than on the memorandum which was an earlier draft. Hoobler was Chief of Police in San Diego.

This study presents evidence from a survey of the San Diego Police Department that is offered to support Hoobler and McQueeney's recommendation that a minimum height standard of 69 inches be retained in San Diego. The study did not find any statistically significant relationship between officers' heights and (1) number of arrests, (2) number of assaults, or (3) amount of sick leave. Significant relationships were found to exist between officers' heights and (1) citizen complaints, (2) injuries to officers, and (3) accidents with police equipment. Shorter officers (i.e., shorter than 69 inches) tended to have the higher rates.

As discussed below, the conclusion that shorter officers were injured significantly more than taller officers is subject to some question. The original data are shown in Table C-1. Part A of Table C-2 (officers injured vs. officers not injured) was presented in the San Diego report and correctly supports a conclusion that a larger percent of the shorter officers are injured. (Of the shorter officers, 35.8 percent were injured one or more times, compared to 20.9 percent of the taller officers.) However, Part B of Table C-2 was not presented in the San Diego report. Part B shows that there was no statistically significant difference in injuries per officer for officers shorter than 69 inches versus those at least 69 inches tall. Shorter officers had an average of .41 injuries per officer versus .31 for taller officers.

Table C-1

SUMMARY OF INJURY EXPERIENCE FOR OFFICERS OF DIFFERENT HEIGHTS IN SAN DIEGO

	HEIGHT		
	Under 69 Inches	69 Inches and Above	All Heights
Number of officers in sample	78	965	1,043
Number of officers injured	28	202	230
Number of incidents of injury	32	299	331

Table C-2

ANALYSIS OF THE NUMBER OF OFFICERS INJURED AND OF THE NUMBER OF INJURIES FOR OFFICERS OF DIFFERENT HEIGHTS IN SAN DIEGO

	HEIGHT		
	Under 69 Inches	69 Inches and Above	All Heights
A. NUMBER OF OFFICERS			
Number of officers not injured	50	763	813
Number of officers injured	28	202	230
Total	78	965	1,043
B. NUMBER OF INJURIES			
All officers	78	965	1,043
Number of injuries (incidents)	32	299	331

CONCLUSION (ANALYSIS OF NUMBER OF INJURIES): There is no difference between the number of injuries sustained by shorter and taller officers (chi-square = 1.635, probability = 0.195).

CONCLUSION (ANALYSIS OF NUMBER OF OFFICERS): Shorter officers were more likely to have been injured at least once than were taller officers (chi-square = 9.042, probability = 0.01).

To summarize these differences, the relationships can be displayed as follows:

HYPOTHESIS TO BE TESTED	DATA SOURCE	IS THE HYPOTHESIS SUPPORTED BY A STATISTICALLY SIGNIFICANT TREND?
A greater portion of shorter officers were injured one or more times than taller officers.	Table C-2 Part A	Yes
On average, the shorter officers sustained more injuries per officer than the taller officers.	Table C-2 Part B	No

The appropriate conclusion based on this study is that a shorter officer is not any more likely to sustain an injury than a taller officer. The data also support a conclusion that a larger percentage of the shorter officers were injured.

The different results can be easily understood. Taller officers had 1.48 injuries per officer injured, compared to only 1.14 injuries per officer injured for the shorter officers. In other words, the injuries to taller officers were more concentrated among a smaller number of officers than those to the shorter officers.

The number of injuries per officer is a more direct and useful measure of the cost to the department than is the percent of officers injured. The report recognizes this economic fact by computing the cost of injuries based on the number of injuries. In making a calculation of the cost of injuries for officers of different heights, the report presented the data in Table C-3.

Table C-3

DATA ON COSTS OF INJURIES IN SAN DIEGO

TYPE OF DATA	HEIGHT OF OFFICER	
	Under 69 inches	69 Inches and Above
Average number of man-days lost per injury incident	5.47	0.42
Average cost per man-day lost	$51.68	$70.07

The very large difference in man-days lost per injury incident (see Table C-3) requires an explanation that the study does not provide. Of the 32 injury incidents among the shorter officers, there apparently were one or two that resulted in a large number of man-days lost.

The differences in the average cost per man-day lost require an explanation. The per man-day costs for taller officers were more than one-third higher than for shorter officers. Apparently, the taller officers have been in the department longer and thus tended to be in the higher paid positions. The article also indicates that shorter officers in the traffic division made more arrests than taller officers in that division because the shorter officers had assignments (e.g., drunk-driving squad) that gave them a greater opportunity to make arrests. It is possible that shorter officers generally had more active assignments than their taller and more senior counterparts.

Two additional observations corroborate the notion that the shorter officers generally have less seniority and could be working in less desirable and higher risk assignments: (1) The minimum height requirement in San Diego has been reduced over recent years. Prior to July 1968, it was 5 feet 9 inches; between July 1968 and the fall of 1971, it was 5 feet 7-1/2 inches; after that it was dropped to 5 feet 6-1/2 inches. On April 13, 1973, 33 officers were hired, of whom five (or 15.1 percent) were 69 inches or shorter. (2) The reduction in the height standard has caused an increase in the percent of shorter officers in the department. At the time of the study, 83 out of 1,085 (or 7.56 percent) of the sworn members of the force were either 69 inches tall or shorter.

"AN ANALYSIS OF PHYSICAL AND EDUCATIONAL REQIREMENTS,"
(Prepared for the Dallas Police Department by Southern Methodist University Law School, Center for Police Development (undated).)

The study was based on a random sample of 100 patrol officers in the Dallas Police Department. Data were collected on performance measures, education, height, and weight of the 100 patrol officers. The results showed little relationship between the officers' characteristics (education, height, weight) and performance measures. Of the 100 officers sampled, only 15 were involved in traffic accidents, and 14 were assaulted. With such small numbers, only very large differences in rates due to height could have been statistically significant, even with relatively flexible standards of significance.

A Kolmogorov-Smirnov test was performed in the study to determine if performance was related to height, weight, or level of education. The results indicated no statistically significant relationship between an officer's height and the likelihood of traffic accidents and assault. Canonical analysis and Pearson correlation analysis were applied to the data but produced no significant indication that height was related to police performance.

A review of previous studies on height, educational standards, and performance in police departments and other organizations also was included in the study.

"A STUDY OF THE POLICE OFFICER HEIGHT REQUIREMENT,"
(Prepared by the Atlanta Regional Commission, Government Services Department, Technical Assistance Division, October 1973.)

This study was conducted to examine the outcomes of confrontations between the police and the public. Data were collected for the period June 1972 to June 1973, from the Atlanta Police Department's personnel files.

The analysis was based primarily on the height distribution of 300 officers drawn from the police department's "Watch Duty Roster," compared with the height distributions of officers assaulted, receiving complaints of police brutality, and injured while on duty. With one exception, the analysis did not reveal any statistically significant relationships involving height. The one exception was that, by eliminating from consideration officers 5 feet 9 inches to 5 feet 11 inches (but not officers shorter than 5 feet 9 inches), there was a statistically significant relationship between height and assaults in the remaining sample.

Unless there was a prior hypothesis which would have justified deleting the middle-height officers--and no such hypothesis was presented--this chi-square test and conclusions drawn from it should be ignored. Even

with this carefully structured sample, there was no statistically significant relationship between an officer's height and the likelihood of injury.

"HEIGHT AND WEIGHT REQUIREMENTS FOR POLICE OFFICERS," (Submitted to the Civil Service Commission, City and County of San Francisco, by Frank M. Verducci, San Francisco State University, 1974.)

The report surveyed current height and weight requirements in police agencies in the United States, with special emphasis on California. Comments gathered from police officers showed that they were strongly opposed to lowering or eliminating height requirements. Data from San Francisco, Seattle, Los Angeles, San Diego and Washington, D.C., were examined but not subjected to any statistical analysis. The report concluded that a comprehensive study should be conducted to ascertain the relationship between an officer's height and weight and the skills required in emergency situations. Quinn Tamm (former executive director of the International Association of Chiefs of Police) and Catherine Milton and Richard Staufenberger (both of the Police Foundation) are cited for their beliefs that there is a lack of data that conclusively relate heights of police officers to job performance.

"ANALYSIS OF ASSAULTED AND NON-ASSAULTED OFFICERS BY HEIGHT, WEIGHT, TENURE, AND ASSIGNMENT," (Prepared by the Planning and Research Division, Portland, Oregon, Bureau of Police, February 1973.)

A sample of 100 assaulted officers was compared with a sample of 100 non-assaulted officers. The groups exhibited the following differences in height, weight, and tenure:

- assaulted officers were, on average, 0.36 inches shorter than non-assaulted officers;
- asaulted officers were, on average, 6.4 pounds lighter than non-assaulted officers;
- assaulted officers had, on average, only 44 percent of the seniority that non-assaulted officers had.

Assaults were found to be highly dependent on an officer's tour of duty, and more senior officers were found most likely to be assigned to the low assault shift (days).

The study separated officers by precinct and shift to control for these factors when analyzing the influence of height on assaults. Chi-square tests were attempted in order to ascertain whether height influenced assault rates. Unfortunately, the statistics were improperly computed by

using percentages of officers and assaults rather than numbers. Furthermore, it appears that a one-sample test was attempted when a two-sample test should have been used.

Another, less serious error with the use of the chi-square technique on the data as categorized in the report is that the numbers in many of the cells were too small for the technique to be applicable. It is commonly suggested that if less than five observations are expected in any cell, the chi-square test should not be used.[18]

Implications often could be drawn from the data by redoing the analysis. A summary of the sample data broken down by relief (shift) and precinct is shown in Table C-4. The group with the largest number of assaults in the sample was the north precinct, afternoon relief, whose performance is shown in Table C-5, broken down by height categories. There was no statistically significant relationship involving height in Table C-5, although the trend is for both the tallest and the shortest officers to have about the same assault rate, which is about twice as high as the rate for the officers in the middle-height ranges. The number of assaulted officers by height category for this shift and precinct cannot be derived from the data presented in the report.

A study of the nine chi-square tables presented in the report where the data were broken down by height, precinct, and relief indicates that the data, as presented, must be analyzed by a Kolmogorov-Smirnov test rather than a chi-square test but that the height intervals in this data are too large for an adequate Kolmogorov-Smirnov test to be performed. In one precinct, shorter officers were more likely to be assaulted than were taller officers (see Table C-6).

The Portland data should be re-examined to determine if there is any trend relating height to seniority so that a more definitive conclusion can be reached about the observed trends--whether they are due to height alone, seniority acting through a height bias, or chance. Increasing the sample sizes and reducing the scope of the height intervals would also be very useful in permitting more meaningful analysis.

---

18 W.G. Cochran, "Some Methods for Strengthening the Common Chi-Square Tests," pp. 417-451.

Table C-4

OVERVIEW OF PORTLAND, OREGON:
SAMPLE OF NON-ASSAULTED OFFICERS AND ASSAULT INCIDENTS

PRECINCT	RELIEF (Shift)	TOTAL NUMBER OF OFFICERS FROM BOTH SAMPLES	NUMBER OF[a] ASSAULTS ON OFFICERS IN THE SAMPLE OF ASSAULTED OFFICERS	RATION OF ASSAULTS TO OFFICERS IN BOTH SAMPLES	NUMBER OF[b] OFFICERS NON-ASSAULTED	NUMBER OF[c] OFFICERS ASSAULTED
North	Afternoon	38	228	6.00	5	33
	Night	22	56	2.55	3	19
	Morning	21	--	--	13	8
Central	Afternoon	30	16	0.53	20	10
	Night	--	--	--	--	--
	Morning	--	--	--	--	--
East	Afternoon	51	20	0.39	38	13
	Night	31	9	0.29	24	7
	Morning	--	--	--	--	--

a From a report on 409 separate assaults filed between January 1, 1972 and December 4, 1972.

b From 2 random samples of 100 officers in the department who were not assaulted.

c From the sample of assault reports.

Table C-5

DISTRIBUTION OF ASSAULTS AND OFFICERS BY HEIGHT IN THE NORTH PRECINCT, AFTERNOON RELIEF, PORTLAND, OREGON

HEIGHT RANGE (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS	AVERAGE ASSAULT PER OFFICER IN COMBINED SAMPLE
	Officers (Assaulted and non-assaulted samples combined)	Assaults	Officers	Assaults		
69-70-1/2	12	110	31.6	48.2	16.6[a]	9.17
71-72-1/2	17	73	76.3	80.2	3.9	4.29
73-74-1/2	6	22	92.1	89.8	-2.3	3.67
Above 75	3	23	100.0	100.0		7.67
Total	38	228				6.00

[a] This is the largest difference in the cumulative percents and is not statistically significant even at the 0.2 level, using a two-sample test. The chi-square value is 4.85 with 3 degrees of freedom using a two-sample test, which is not significant, even at the 0.1 level (probability = 0.19).

Table C-6

DISTRIBUTION OF ASSAULTS AND OFFICERS BY HEIGHT IN THE CENTERAL PRECINCT, AFTERNOON RELIEF, PORTLAND, OREGON

HEIGHT RANGE	NUMBER IN SAMPLE			CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Assaults	Officers assaulted	Officers not assaulted	Assaults	Officers not assaulted	
69-70-1/2	13	7	3	81.3	15	66.3[a]
71-72-1/2	2	2	13	93.8	80	13.8
73-74-1/2	1	1	4	100.0	100	0.0
Above 75	0					
Total	16	10	20			

[a] This is the largest difference in the cumulative percents and is statistically significant at the 0.01 level using a two-sample Kolmogorov-Smirnov test.

"A STUDY OF POLICE HEIGHT REQUIREMENTS,"
(Prepared by C.A. Dempsey, Texas Department of Public Safety, April 1974.)

Inquiries were mailed to 403 agencies in the United States, and 193 responses were received. Among the data provided as a result of the inquiries were studies and related information from state and city police departments. Seven studies provided the bulk of the supportive evidence cited; these studies include material from departments in the following cities:

- San Diego, California,
- Portland, Oregon,
- Evansville, Indiana,
- Seattle, Washington,
- Washington, D.C.,

- Beaumont, Texas,
- Miami, Florida,
- Cincinnati, Ohio and
- Des Moines, Iowa.

Data were provided by seven state agencies, 39 cities, and 11 other agencies. A valuable service was rendered by collecting data. Unfortunately, the methodological and arithmetical errors in the study are so frequent and serious that the reader cannot judge whether many of the conclusions are valid.

Eleven tables were presented in which the distribution of police officers and incidents were displayed for officers of different heights. Four of the tables were taken directly from the San Diego study, and the statistics appear to be correctly computed. Six other tables contain improperly computed statistical results--the chi-square values have been incorrectly computed by using percentages of the observations rather than the number of observations. In another table, the level of significance of the results is incorrectly interpreted because the wrong degrees of freedom were attributed to the chi-square statistic. In summary, serious errors are apparent in seven of the eleven tables for which chi-square tests were performed.

"THE EVANSVILLE POLICE DEPARTMENT'S MINIMUM HEIGHT REQUIREMENT: A BONA FIDE OCCUPATIONAL QUALIFICATION," (Prepared by the Evansville Indiana Police Department, Personnel and Training Division, Planning and Research Section, November 6, 1973.)

This is a comparatively thorough effort to examine the relationship between an officer's height and performance. The principal defect in the study is that Evansville, like other departments in the country, has a history of lowering its height standards (i.e., the height standard was lowered to 68 inches in 1965). Hence, the most senior officers also are more likely to be the taller officers and the simple height-performance relationships shown in the study may be very misleading.

The samples in this study consisted of: 229 officers studied over 21 months, 35 physical abuse complaints, 71 verbal abuse complaints, and 50 injuries. The study presents data on the relationship between height and three measures of performance: physical abuse complaints, substantiated or unsubstantiated verbal abuse complaints, and injuries. Statistical analysis of these data, using a Kolmogorov-Smirnov two-sample test, indicates that:

- there was no statistically significant relationship between height and physical abuse complaints (the test is almost statistically significant at the 0.10 level), with officers 69 inches or shorter comprising 18 percent of the department and receiving 40 percent of the complaints;

- officers who were 69 inches or shorter received more substantiated verbal abuse complaints (substantiated and unsubstantiated) than taller officers (significant at 0.05 level); with these shorter officers comprising 18 percent of the deparment and receiving 44 percent of the complaints;

- officers who were 69 inches or shorter were more likely to be injured during encounters with citizens (significant at 0.10 level); with these shorter officers comprising 18 percent of the department and receiving 40 percent of the injuries.

The study did not present any data concerning the number of arrests made or number of commendations received by officers in the sample (earlier, it was reported that officers who receive complaints also are likely to receive commendations).

"A STUDY OF: THE MINIMUM HEIGHT REQUIREMENT FOR THE CLASSIFICATION OF OFFICERS," (Prepared by T.R. Cochran, Arizona Department of Public Safety, Planning and Research (undated).)

Although undated, this short paper was apparently written sometime after March 1973. It consists primarily of a review of about a dozen documents related to height of police officers and does not make any claim to being a complete research project on the subject. The report makes an interesting observation: the Phoenix Police Department reports that the average height of male suspects assaulting police officers was 69-1/2 inches, compared to an average height of the officers involved of 71 inches (the assailants are, on average, shorter than the officers assaulted).

"A DESCRIPTIVE PROFILE OF THE ASSAULT INCIDENT," (Prepared by Samuel G. Chapman and Cheryl G. Swanson, April 30, 1974 (abstracted from a program report, "Assaults on Police Research Project," at the University of Oklahoma).)

An extensive study of assaults on police officers was being conducted by Samuel Chapman of the University of Oklahoma. (According to T.R. Cochran, this study has been discontinued.) The study is based on a sample of 1,143 assault incidents, for which data were collected on the following four dimensions:

- officer characteristics,
- assailant characteristics,
- assault environment,
- dynamics of the assault event.

Most of the data came from cities in Oklahoma.

Although the study provided data on the distribution of height of officers assaulted, it did not reach any conclusion about the likelihood of assaults on officers of different heights, because no data were available on the heights of non-assaulted officers.

A correlation analysis was performed on the heights of the officer and of the assailant, and the correlation was found to be very low (0.001, not statistically significant, even at the 0.2 level f significance). This finding suggests that there was no connection between height differences and an assailant's decision to attack an officer.

Assaults occurred much more frequently (86.2 percent) between 4 P.M. and 4 A.M. than during the remaining 12 hours of the day: only 13.8 percent occurred during the remaining 12 hours. This shows that the exposure to assaults can be highly dependent on the hours of the day which the officer works.

More recently Swanson and Hale have published an article[19] on their analysis of the data. Results cover a survey of 1900 police officers in 13 municipal police agencies[20] during the calendar year 1973. By comparing the 376 officers who were assaulted one or more times with the remaining 1524 who were not assasulted during the one year sample period, the authors conclude that ". . . the data do not support the premise that shorter officers have an overall greater probability of being assaulted than taller police personnel."

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19 Cheryl G. Swanson, Charles D. Hale, "A Question of Height Revisited: Assaults on Police," Journal of Police Science and Administration, Vol. 3, No. 2, pp. 183-188.

20 Abilene, Texas; Amarillo, Texas; Austin, Texas; Bossier City, Louisiana; Galveston, Texas; Lake Charles, Louisiana; Lawton, Oklahoma; Monroe, Louisiana; Norman, Oklahoma; North Little Rock, Arkansas; Oklahoma City, Oklahoma; Pine Bluff, Arkansas; Tulsa, Oklahoma.

Although data were collected on such variables as training, education, tenure, and age of officers, the authors only report that these variables will be the subject of subsequent reports. The conclusions would be significantly strengthened once the authors examine these variables for possible indications of correlations between height and seniority or assignment, and report the recent history of height standards used in the departments studied.

No statistical tests of significance were utilized by Swanson and Hale when comparing assaulted and non-assaulted officers. However, using the Kolmogorov-Smirnov test on the samples of assaulted versus non-assaulted officers, analysis shows the height distributions of the two populations are not statistically different even at the 0.1 level of significance.

The article neglects to provide the reader with any justification on whether the data from 13 different cities can be aggregated. Are the height distributions similar across cities? Is the definition of "assault" common to all cities? Until a more complete analysis of the data become available, a strong conclusion drawn from the data is ill advised on the issue of height and assault rate.

FREQUENTLY CITED DATA

Some sets of data frequently mentioned in various studies on height are presented here for easy reference. They consist of data from four police departments, as follows:

- Metropolitan Police Department, D.C.--Assaults (Tables C-7, C-8),
- Los Angeles Police Department--Injuries (Tables C-9, C-10),
- Seattle Police Department--Assaults (Table C-11),
- San Francisco Police Department--Injuries (Table C-12).

Since these data sets are not accompanied by any indication of seniority or assignments, they cannot be used to reach any definitive conclusions relating to height.

The distribution of young adult men and women in the U.S. by height according to a 1960-1962 survey is shown in Table C-13.

Table C-7

ASSAULTED AND NON-ASSAULTED MALE POLICE EMPLOYEES OF DIFFERENT HEIGHTS IN THE WASHINGTON, D.C., METROPOLITAN POLICE

HEIGHT (Inches)	CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Assulted[a] Employees	Non-Assaulted[b] Employees	
66	0.0	0.0	0.0
67	0.5	2.7	-2.3
68	19.9	12.2	7.7
69	40.6	26.4	14.2
70	59.3	42.1	17.2[c]
71	71.6	60.0	11.6
72	83.4	77.6	5.8
73	93.2	86.8	6.4
74	97.4	93.6	3.8
75	98.7	97.4	1.3
76	99.5	99.3	0.2
77	100.0	99.8	0.2
78	100.0	100.0	0.0

SOURCE: Sergeant Mary Ellen Abrecht.
NOTE: Data are from 1971.
CONCLUSION: Shorter officers have a higher probability of being assaulted.

a
N = 236.
b
N = 4,434.
c
This is the greatest difference in the cumulative distributions of officers assaulted and of officers not assaulted. It is statistically significant at the 0.0001 level of significance.

Table C-8

ASSAULTS ON POLICE EMPLOYEES OF DIFFERENT HEIGHTS IN WASHINGTON, D.C.

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Employees	Assaulted Employees	Employees	Assaulted Employees	
66	12	0	0.2	0.0	0.2
67	187	12	4.1	4.7	-0.6
68	496	37	14.4	19.1	-4.7
69	706	51	29.1	38.9	-9.8
70	745	47	44.5	57.2	-12.7[a]
71	828	34	61.7	70.4	-8.7
72	809	30	78.5	82.1	-3.6
73	430	25	87.5	91.8	-4.3
74	314	14	94.0	97.3	-3.3
75	170	3	97.6	98.4	-0.8
76	86	2	99.4	99.2	0.2
77	26	2	99.9	100.0	-0.1
78	5	0	100.0	100.0	0.0

SOURCE: Analysis by the authors of this report of data reported by Frank Verducci, p. 26 (see a review of the report on page 104 of this report).

NOTE: Data are for 1971.

CONCLUSION: Shorter personnel have a higher assault rate.

a This is the greatest difference in the cumulative percent of all officers and assaulted officers. The difference is statistically significant at the .001 level.

Table C-9

INJURIES TO POLICE EMPLOYEES OF DIFFERENT HEIGHTS
IN THE LOS ANGELES POLICE DEPARTMENT

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Employees	Injured Employees	Employees	Injured Employees	
68	320	163	8.5	16.3	-7.8
69	538	184	22.7	34.7	-12.0[a]
70	887	178	46.1	52.6	-6.5
71	727	216	65.3	74.2	-8.9
72	550	96	79.9	83.8	-3.9
73	366	63	89.5	90.1	-0.6
74	396	99	100.0	100.0	0.0
Total	3,784	999			

SOURCE: Analysis by the authors of this report of data reported by Frank Verducci, p. 35 (see a review of the report on page 104 of this report).
NOTE: Data are from 1965.
CONCLUSION: Shorter personnel have a higher injury rate.

a
This is the greatest difference in the cumulative percents of employees and of injured employees. The difference is statistically significant at the 0.001 level.

Table C-10

INJURIES TO MALE POLICE EMPLOYEES OF DIFFERENT HEIGHTS IN THE LOS ANGELES POLICE DEPARTMENT

HEIGHT (Inches)	CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Employees Injured[a]	Employees Not Injured[b]	
68	10.5	2.1	8.4
69	30.2	18.6	11.6[c]
70	50.2	40.6	9.6
71	71.2	59.6	11.7
72	81.6	76.8	4.8
73	89.7	88.3	1.4
74	95.1	95.4	-0.3
75	97.2	98.2	-1.0
76	98.7	99.7	-1.0
77	100.0	99.9	0.1
78			
79		100.0	0.0

SOURCE: Police Foundation, Washington, D.C.
NOTE: Data are from 1960.
CONCLUSION: Shorter officers have a higher injury rate.

a
N = 539.
b
N = 2,930; however N could be 2,828, due to uncertainty in reading numbers making up the total.
c
This is the greatest difference in the cumulative percents of officers injured and of officers not injured. The difference is statistically significant at the 0.001 level.

Table C-11

ASSAULTS ON POLICE EMPLOYEES OF DIFFERENT HEIGHTS IN SEATTLE, WASHINGTON

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Employees	Assaulted Employees	Employees	Assaulted Employees	
69	176	114	15.2	23.8	-8.6
70	232	108	35.2	46.3	-11.1[a]
71	227	83	54.8	63.7	-8.9
72	215	70	73.4	78.3	-4.9
73	132	39	84.8	86.3	-1.5
74	84	34	92.1	93.5	-1.4
75	60	23	97.2	98.3	-1.0
76	23	3	99.2	99.0	0.2
77	5	5	99.7	100.0	-0.3
78	4	0	100.0		0.0
Total	1,158	479			

SOURCE: Analysis by the authors of this report of data reported by Frank Verducci, p. 24 (see a review of the report on page 104 of this report).

NOTE: Data are for 1971.

CONCLUSION: Shorter personnel have a higher probability of being assaulted.

[a] This is the greatest difference between the cumulative percents of employees and of assaulted employees. The difference is statistically significant at the 0.001 level.

Table C-12

INCIDENTS OF RESISTING ARREST AND OF BATTERY AGAINST POLICE EMPLOYEES OF DIFFERENT HEIGHTS IN SAN FRANCISCO

HEIGHT (Inches)	NUMBER		CUMULATIVE PERCENT		DIFFERENCE IN CUMULATIVE PERCENTS
	Employees	Resisting and Battery Incidents	Employees	Employees Involved in Incidents[a]	
67-68	75	29	3.9	3.0	0.9
68-69	243	67	16.6	10.1	6.5
69-70	412	168	38.1	27.8	10.3
70-71	367	166	57.2	45.2	12.0[b]
71-72	358	187	75.9	64.9	11.0
72-73	229	129	87.8	78.4	9.4
73-74	116	97	93.9	88.6	5.3
74-75	65	73	97.3	96.3	1.0
75-76	43	25	99.5	98.9	0.6
76-77	5	9	99.8	99.9	0.2
77-78	4	1	100.0	100.0	0.0
Total	1,917	951			

SOURCE: Analysis by the authors of this report of data reported by Frank Verducci, p. 22 (see a review of the report on page 104 of this report).

NOTE: Data are from July 1, 1972 to August 30, 1972.

CONCLUSION: Shorter personnel have a lower probability of being involved in an incident of resisting arrest or battery (assault).

a Incidents include resisting arrest or battery on a police officer.

b This is the greatest difference between the cumulative distribution of employees and of employees involved in incidents. The difference is statistically significant at the 0.001 level.

Table C-13

HEIGHT DISTRIBUTIONS OF YOUNG ADULT MEN AND WOMEN

HEIGHT (Inches)	CUMULATIVE PERCENT OF U.S. (1960-62) POPULATION, AGE 18-24 YEARS, LESS THAN OR EQUAL TO GIVEN HEIGHT	
	Men	Women
60		12.1
61	0.2	23.9
62	1.5	40.1
63	3.7	51.3
64	7.7	70.6
65	12.8	81.2
66	28.6	91.9
67	41.3	95.3
68	56.1	98.8
69	68.7	99.5
70	81.0	99.9
71	86.2	
72	94.7	
73	97.8	
74	99.2	
75	99.8	

SOURCE: U.S. Department of H.E.W., Public Health Services, National Center for Health Statistics, Weight by Height and Age of Adults, United States 1960-62, Series 11, Number 14, May 1966. (More recent data have not been published by HEW as of January 1975.)

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