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# Stature and Criminal Behavior

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STATURE AND CRIMINAL BEHAVIOR

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

by

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# Abstract

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Minorities are significantly overrepresented in America's prison population, and many

studies have been conducted to determine possible causes for such a disparity.  Few of

these studies, however, have examined small stature as a potential contributor to criminal

behavior.  This study examines the relationship between criminal behavior and stature

among American males.  The heights, weights, stature scores (a function of the product

of height and weight) and the body mass indices of criminals are examined as a whole, as

well as by subgroup based on race, locality, and nature of the crime committed. The

average weight of the male criminal population is substantially lower than that of the

general male population. The center of the height distribution for urban criminals is found to be lower than men who commit crimes in suburban or rural areas, as is the center of the weight distribution for index criminals when compared to non-index criminals. Murderers demonstrate the smallest mean and median heights and weights when compared to the rest of the criminal population. Although small stature can be associated with certain crimes and localities, size cannot be associated with the racial disparity in today's prisons.

# 1. INTRODUCTION

"Smaller than average stature is quite generally regarded by men as a disadvantage and must be in some degree frustrating. Although inferior size alone would not be expected to 'produce' criminality in any given individual, it should show its influence statistically." (Dollard, Doob, Miller, Morwer and Sears, p. 119)

This notion of a relationship between size and criminality has been reiterated over the past hundred years, and several studies have been conducted to try to determine if such a relationship exists (Goring, 1913, Hooton, 1939, Sheldon et al., 1949). However, society has changed so dramatically in that same time period, results that were discovered in the early 1900's cannot be applied to today's standards. For instance, Goring's and Hooton's studies did not include minorities in their samples; Sheldon's study did include minorities, but the country's demographics have changed so substantially since that time that the results may not be representative of today's population. In addition, drugs were not mentioned in the first two major studies in the field (Goring, 1913, Hooton, 1939.), and drugs play a large role in criminal activity today. Finally, with the prevalence of weapons today, large stature is not necessarily an advantage in confrontational crimes; a

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man of inferior size who is armed can easily overtake an unarmed, physically superior man.

## 1.1 Previous Studies

Charles Goring (Goring, 1913) investigated numerous physical aspects of convicts in England, including height and weight, in an effort to determine if criminals were somehow physically different from the general population. In addition to noting the height and weight of each convict, Goring also noted his age, general health, and social class, suggesting that these components can directly affect a man's physical appearance.

Goring split the convicts into subgroups based on the nature of the crime they committed; the five resulting categories were Willful Damage (Including Arson), Stealing and Burglary, Sexual Offense, Violence Against the Person, and Crimes of Fraud. Comparative analysis of the subgroups showed the men convicted of fraud were significantly taller and heavier than the men in the other four categories. Goring also noted that vandals and sex offenders were lighter than the convicts in the other categories, although their heights were similar to those found in the Stealing and Burglary and Violence Against the Person categories.

Goring did report the average height of the convicts as being nearly two inches shorter than the average height of men in the general population. However, when he took into account the variables of age and social class and calculated confidence intervals for each group, he found no significant differences between the size of men in prison and those in the general population.

Ernest Albert Hooton conducted a similar study in the United States (Hooton, 1939). Although his methodology was different from Goring's, the premise was still the same: male criminals may be physically different from the general population. Hooton began by placing each of the 3910 male criminals in the study, who were all Caucasians, into one of nine subgroups based on his height and weight. The convicts could be considered Short, Medium or Tall with respect to height, and Slender, Medium or Heavy with respect to weight. The nine resulting categories all had different sample sizes, so percentages were used when making comparisons among the groups.

Hooton also divided the crimes into categories; he created ten categories compared to Goring's five. His ten types of crime were Murder 1 (which involves premeditation), Murder 2, Assault, Robbery, Burglary, Fraud, Rape, Other Sexual Offense, Versus Public Welfare (usually bootlegging), and Arson. He then gave each of the nine height/weight groups a ranking based on the percentage of each group that committed each offense. The height/weight group which committed the crime most frequently received a rank of 1; the height/weight group which committed the same crime the least often received a rank of 9.

By creating a table of the rankings, Hooton was able to look for patterns of behavior among each height/weight group. He noted the frequency of Murder 1 offenses among the Tall men and sex offenses among the Short-Heavy group. In addition, he observed Short-Slender men being first in Burglary but last in Robbery (which involves taking property by force). Using this table, Hooton made several conclusions about the relationship between size and criminality, but those conclusions were very specific to that

time period and are not applicable today. In addition, the entirely Caucasian sample is not representative of today's ethnically diverse population, so those findings need to be updated.

Using means and probable errors, however, Hooton did note that (Caucasian) criminals "are markedly below the civilians in body weight, even when due allowance is made for age differences...The deficiency cannot reasonably be attributed to prison diet and hygiene, since these conditions are in all probability superior to those enjoyed by persons of the same prevailingly low economic and social status in the civilian population." (Hooton, p.216). The criminal and civilian weights averaged 147.9 pounds and 159.6 pounds respectively (Hooton, p. 203), which are markedly less than today's averages. Although the numbers clearly are not representative of today's population, this notion that criminals weigh significantly less than the general public may still be a valid conclusion.

Ten years later, William Sheldon published the results of his study comparing physique and delinquent behavior (Sheldon, et al., 1949). Sheldon examined the physiques, temperaments, and behaviors of 200 troubled boys who were referred to a center for education and rehabilitation counseling. He developed a new method for describing body type, the Somatotype, which is a three digit combination that ranks an individual on three different aspects of physique. This method was derived from pure-bred dog and horse shows, which Sheldon attended regularly as a child. In a pure-bred show, each animal is assigned a score based on certain physical characteristics; he

applied the same strategy to humans, giving them each a rank from 1 to 7 on the following three categories.

1. Endomorphy, from a biological standpoint, is the predominance of the digestive system, which results in a body type that can put on fat quite easily. According to Sheldon, this physique is accompanied by the personality type Visceratonia, which is characterized by relaxation and over indulgence. These people thrive on food, affection, social support, and other physical comforts.

2. Mesomorphy is the predominance of muscle, bone, and connective tissue, resulting in a strong, muscular physique. Mesomorphy is accompanied by the personality type Somatotonia; people in this category love power, are physically assertive, and demonstrate courage in their desire to take risks.

3. Ectomorphy is the predominance of skin, appendages, and the nervous system; this is demonstrated physically by a lanky, skinny physique. The accompanying personality type, Cerebrotonia, is associated with a love of privacy, mental over intensity, and sociophobia.

As stated before, Sheldon determined the boys' Somatotypes by ranking each of the boys on a scale from 1 to 7 for Endomporphy, Mesomorphy, and Ectomorphy, in that order. He then examined patterns in behavior among the boys and compared them to their Somatotypes. Among the 200 boys in the study, 16 of them demonstrated behavior so extreme they were labeled as criminal; all of those boys were high in Endomorphy and Mesomorphy but low in Ectomorphy. However, Sheldon cautioned against declaring that

this particular physique results in criminal behavior; most successful businessmen, army generals, and fiction writers share that same Somatotype. He did, however, note that this Somatotype is characterized by vitality and freedom from inhibition.

Sheldon was also reluctant to make any conclusions about height and criminal behavior. He did note that his 16 criminals were, on average, over an inch shorter than the 200 boys as a whole. However, he also stated that a sample size of 16 was too small for him to feel comfortable about drawing any conclusions about height. He referred his readers to Hooton's study, but with one word of caution. He criticized Hooton's tool used to measure height, the anthropometer, which did not have anything for the men to stand against during their measurement. Poor posture, Sheldon contended, could cause an individual's height measurement to be significantly shorter than his actual height.

In 1982, Emil Hartl, Edward Monnelly, and Roland Elderkin published a 30 year follow up to Sheldon's study (Hartl, et al., 1982). The same 200 boys were followed into adulthood, with their somatotypes measured once again by using a concrete formula of ratios as opposed to a simple observation. The sixteen criminals were found to be high in Mesomorphy, average in Endomorphy, and low in Ectomorphy. The authors noted "this is the Somatotype of the hard bitten tough man with few compunctions to hold back his predatory instincts" (Hartl, et al., p. 500).

## 1.2 Height, Weight, and BMI statistics

The National Health and Nutrition Examination Survey (NHANES) conducted by the Center for Disease Control (CDC) from 1999-2000 reports the average height and weight

of adult males in America, both as a whole and broken down by ethnicity. The average height of an American male over age 19, regardless of race, is 69.2 inches, and the average weight is 189.8 pounds. Both of these figures show a marked increase from the heights and weights reported in Goring's and Hooton's studies. The CDC acknowledges the average height for males has increased by approximately one inch since 1960, and the average weight has increased 24 pounds over the same time frame (CDC, 2002).

The median height for American males is 69.1 inches (NHANES, 1999-2000), which is consistent with the mean. This consistency shows the heights of American males are symmetrical, meaning for every male above average in height there exists a male equally below average in height. The median weight, however, is only 176 pounds (NHANES, 1999-2000). This fourteen pound disparity between the mean and median shows the weights of American males are not symmetrical but rather right skewed; this occurs because a portion of the population is several hundred pounds above "average," and there is not an equal portion of the population that is several hundred pounds below "average." Considering the average weight is approximately 190 pounds, an adult male will rarely be even 100 pounds below average.

The NHANES study examined the average heights of three individual ethnic groups as well; the other ethnic groups were not specified. The average height for non-Hispanic Caucasian males is 69.7 inches, non-Hispanic African-American males is 69.5, and Mexican-Americans is 66.7 (Figure 1). The median heights for each group are similar in value, demonstrating that the heights for each ethnic group are also

symmetrical. These values will be used as the standard to determine if criminal heights

for each ethnic group differ significantly from the mean/median.

Figure 1. **Average Heights by Ethnicity**
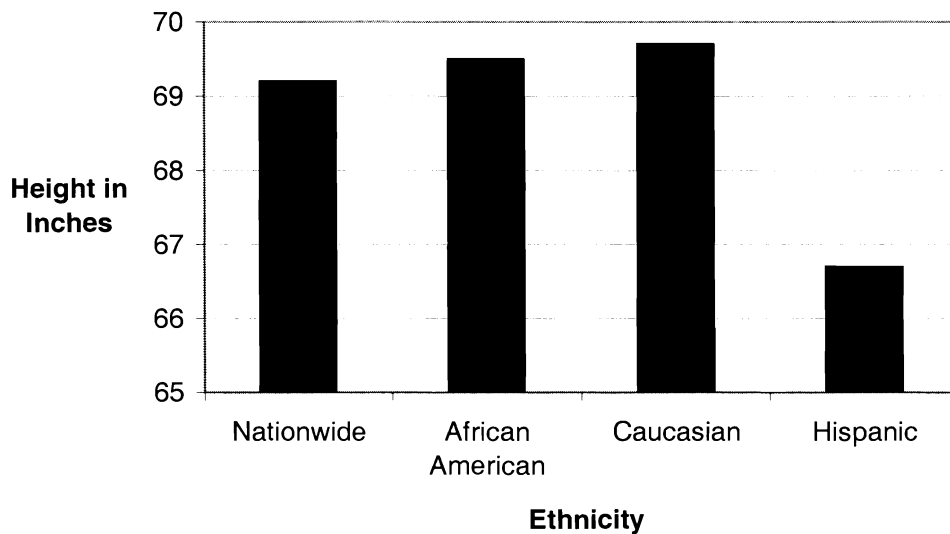


The average weight of 189.8 pounds can also be broken down by ethnic group.

Non-Hispanic Caucasians average 193.1 pounds, non-Hispanic African-American males

average 189.2 pounds, and the average weight for Mexican-Americans is 177.3. The

median weights are 176, 176, and 171.5 respectively, again demonstrating the weights of

the individual ethnic groups are right skewed as well (Figure 2).

Body Mass Index (BMI) is a measure used to describe a person's weight relative

to his or her height. This figure is calculated by dividing a person's weight in kilograms

by the square of his or her height in meters. In 1998 an expert panel created by the

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and the

National Heart, Lung, and Blood Institute (NHLBI) deemed that a BMI in excess of 25

indicates a person is overweight and a BMI in excess of 30 indicates obesity. According

to these figures, 67.2% of adult males in this country are overweight and 27.5% of those

males are obese (Census 2000, NHANES 1999-2000).

Figure 2. **Mean vs. Median Weight**
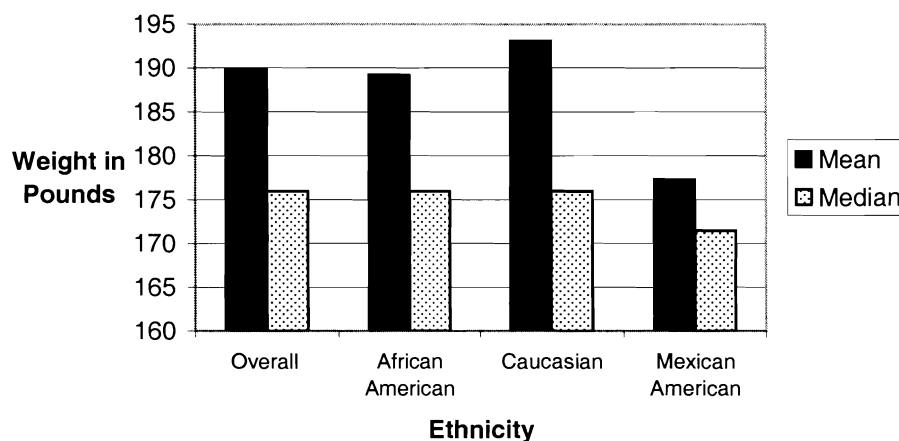


Broken down by ethnicity, 60.7% of adult African American males, 74.7% of

adult Mexican American males, and 67.4% of adult Caucasian males are overweight.

The overall average BMI for adult males nationwide, regardless of ethnicity, is 26.7,

which falls in the overweight category (Figure 3).


**1.3 Prison Statistics**

The current ethnic disparity in the prison population is remarkable. Caucasians comprise

62.8% of the general population but only 35% of the prison population. Conversely,

African-Americans and Hispanics comprise 12.5% and 12.3% of the general population,

respectively, but a stunning 44% and 19% of the prison population (Bureau of Justice

Statistics, 2005, U.S. Census Bureau, 2005). It must be noted, however, that the census

Figure 3. **BMI for American Males**
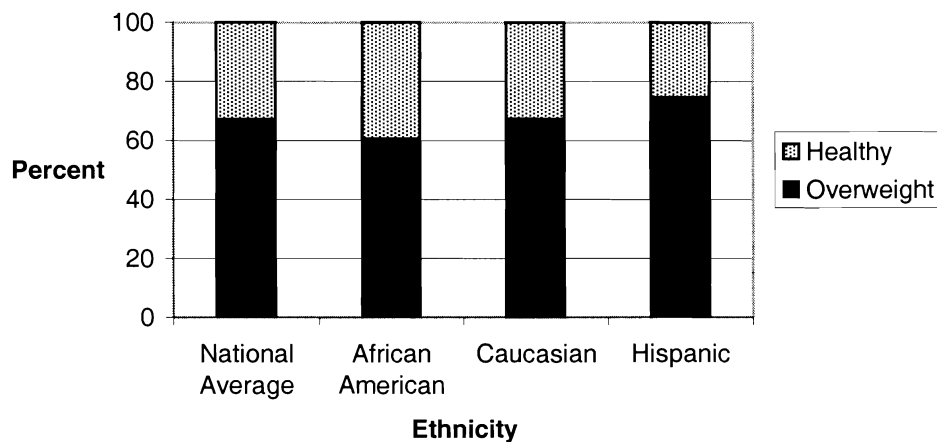


may not have included all residents in the country in its calculations; illegal immigrants

are often not counted in the census, allowing for the potential for the population

percentages to be incorrect. Nevertheless, these numbers are the best estimates available;

the values listed in the census will be considered to be the correct values for this study.

Figure 4. **Population Percentages**
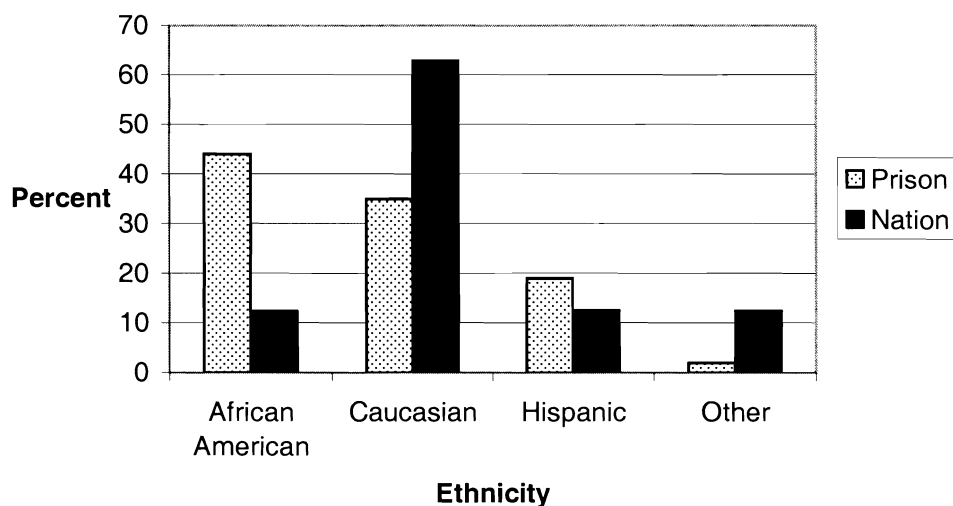
## 1.4 Problem Statement and Research Objectives

The problem under consideration is whether smaller than average stature plays a role in criminal activity in today's multicultural society, essentially modernizing the findings of previous studies in the field. The research will involve determining the heights, weights, stature scores (a function of the product of height and weight) and BMIs of criminals posted on local Most Wanted websites throughout the country. In addition, each criminal's ethnicity, locality (urban as opposed to suburban or rural) and crime committed will be examined to determine if stature plays more of a role in certain ethnic groups, localities, or types of crime. Lastly, comparisons will be made to determine if size can explain any of the racial disparity in today's prisons.

## 2. THE SAMPLE

The sample consists of 4481 males posted on local Most Wanted websites that were reached through links established on CourtTV.com's Most Wanted page. The links include local sites from all fifty states and Washington, D.C. What must be stated first and foremost, however, is that even though the men in this study will be collectively referred to as criminals, some of these men have not yet been convicted of the crime for which they are sought. Others have been convicted and either failed to appear for sentencing, violated parole conditions, or escaped prison. Regardless of conviction status, any male whose height, weight, race and crime are listed on a Most Wanted web page is included in this study. The only exceptions are the men whose crimes are listed as "escape," "parole violation," or "resisting arrest" without the original crime being stated.

### 2.1 Types of Crime

For the purposes of this study, each male is associated with only his most serious crime, even if that individual is sought for a variety of offenses. The crimes are categorized in

accordance with the FBI's Uniform Crime Reporting (UCR) guidelines (FBI, 2006), which classify crimes as being either index or non-index crimes. The index crimes are considered more serious due to the nature of the crime or the high rate at which the crimes occur. Index crimes are listed below with the number of men in each category stated, and their formal definitions are provided, as stated by the UCR:

1. **Murder and Non-Negligent Manslaughters (544):** the willful (non-negligent) killing of one human being by another.

2. **Forcible Rape (348):** the carnal knowledge of a female forcibly and against her will. Attempts to commit rape through force or threat are also included; however, statutory rape and other offenses are excluded.

3. **Aggravated Assault (725):** an unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury.

4. **Robbery (160):** the taking or attempted taking of anything of value from the care, custody or control of a person or persons by force or threat of force or violence and/or putting the victim in fear.

5. **Property Crime (629):** the taking of money or property without force or threat of force against the victims. The property crime category includes arson, burglary, larceny-theft and motor vehicle theft.

## 2.2 Locality

Since the local Most Wanted pages feature people sought for crimes committed in their jurisdiction, each criminal is categorized based on where the crime was committed, not

necessarily where the person resides. Each criminal's location falls into one of two categories, urban or suburban/rural; urban, in this case, refers to major metropolitan areas only. The breakdown is 1675 crimes in urban settings (37.32%) and 2813 from suburban/rural settings (62.68%).

## 2.3 Ethnicity

The sample, in accordance with NHANES, is divided into four categories: African American, Caucasian, Hispanic and Other. Within the sample, 23.08% are African American, 37.10% are Caucasian, 35.54% are Hispanic and 4.28% fall into the category of "other" (Figure 5).

Figure 5. **Population Percentages by Ethnicity**
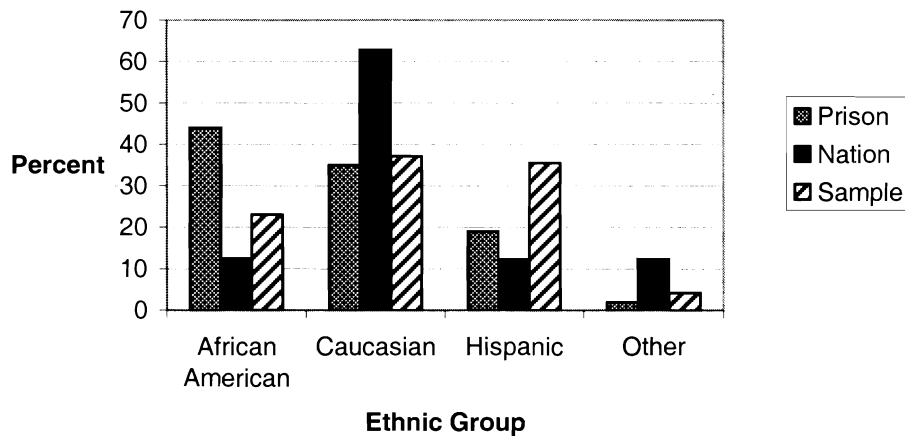
# 3. METHODOLOGY

This chapter will describe some of the calculations used and the statistical analysis performed on the data. The reasoning behind the chosen method will be explained, as will the procedures involved. SPSS version 14.0 and NCSS version 2.0 are used in the analysis.

## 3.1 Calculations

Each criminal's height and weight are reported on the web, and that information is collected as empirical data. The individual's Body Mass Index is then calculated from that information. Since the heights and weights are reported in inches and pounds, the formula for finding BMI is as follows

$$BMI = \frac{WT / 2.2}{\left(HT / 39.37\right)^2}.$$

The divisions by 39.37 and 2.2 are used to convert height and weight to meters and kilograms, respectively.

BMI is used to describe a person's weight *relative to his or her height*. As stated before, a BMI less than 25 is considered healthy, between 25 and 30 is overweight, and over 30 is obese. This value is necessary when describing a man's physique because simply stating his weight does not indicate his overall appearance. For instance, a 200 pound man would be obese if he were 60 inches tall (BMI = 39.35), would be overweight if he were 72 inches tall (BMI = 27.45), and would be healthy if he were 78 inches tall (BMI = 23.19). One must remember, however, that these figures are guidelines; it is possible for a man to fall into the obese category when his excessive weight is actually due to muscularity. In this case "obese" is an inappropriate descriptor; however, the high BMI value would still correctly indicate this person is large for his height.

The drawback to BMI is that its value only describes if a person is slim or heavy for his or her height. BMI alone does not provide an overall picture of a man's physique. For instance, a 60 inch man who weighs 117.5 pounds and an 80 inch man who weighs 208 both have a BMI of 23, even though they have very different physiques. To compensate for this problem, the author has used the following means for determining a man's size, referred to simply as his Stature Score

$$StatureScore = \frac{HT \times WT}{1000},$$

where height is in inches and weight is in pounds. In this scenario, the 60 inch, 117.5 pound man would have a Stature Score of 7.05; whereas, the 80 inch, 208 pound man would have a Stature Score of 16.64. The BMI and Stature Score work in conjunction to provide a better description of the individual's physique than either measure would provide alone.

## 3.2 Statistical Methods

The Wilcoxon Rank Sum procedure (Hollander, M. and Wolfe, D., 1999) involves determining if two similarly shaped distributions are centered about the same point. The two distributions, X and Y, have the following relationship

$$X = Y - \Delta.$$

The null hypothesis assumes the two distributions do have the same center; in other words

$$H_0 : \Delta = 0.$$

The alternative hypothesis states there is a significant shift between the two distributions, or

$$H_a : \Delta \neq 0.$$

The procedure itself begins by combining the two datasets, dataset X of size $m$ and dataset Y of size $n$, into a single dataset of size N. The data values are then ordered and given the appropriate ranks. When ties occur between values, the average of their ranks is assigned to each of those values. The datasets are then considered separately again, and the ranks of dataset Y (size $n$) are summed. Since the two datasets may be of

different sizes, one cannot expect that distributions centered about the same point will have the same rank-sum. Assuming that the null is true and X and Y are centered about the same point, the expected value for the sum of the ranks, W, of dataset Y is:

$$E[W] = \frac{n(N+1)}{2}.$$

When considering all the possible combinations of ranks that can be created by the two datasets, the total number of possible combinations is determined by

$$\binom{N}{n}.$$

Those *sums* are normally distributed with the center of that distribution falling at $E[W]$ as calculated above. Since the distribution for the sum of the ranks is normal (even though the original populations are not), a Z-Score can then be utilized once a variance is determined.

The formula for the variance is as follows

$$Var(W) = \frac{mn(N+1)}{12}\left[1 - \frac{\sum_{1}^{g}\left(t_j^3 - t_j\right)}{N^3 - N}\right],$$

where $g$ represents the number of ties that are present in the datasets and $t_j$ is the size of the $j^{th}$ tie. If no ties are present, the variance is simply

$$Var(W) = \frac{mn(N+1)}{12}.$$

The presence of ties reduces the variability in the data and lowers the variance accordingly.

At this point all of the factors are in place to determine the Z-Score, which is

$$Z = \frac{W_{OBS} - E[W]}{\sqrt{(Var[W])}}.$$

An observed rank-sum that is far from $E[W]$, the sum one would expect to obtain if the datasets are equal, would result in a Z-Score that is large in magnitude. In this study, $\alpha = .05$ with a two-tailed alternative hypothesis, so any Z-Score whose absolute value meets or exceeds 1.96 is deemed to be significant; in other words, its corresponding p-value would be less than or equal to $\alpha$. Consequently, the null hypothesis would be rejected in favor of the alternative, which states that there exists a value $\Delta \neq 0$ which represents the value of the shift between the centers of the two datasets. Simply stated, one can say with 95% confidence that there is a difference in location between the two populations in question.

Should the magnitude of the Z-Score be less than 1.96, meaning the p-value exceeds $\alpha$, the null hypothesis would not be rejected, and one could conclude that no significant differences in location exist between the two datasets.

# 4. FINDINGS

## 4.1 Criminals vs. the General Population

The criminals' sizes are compared to those of the general population using the measures stated earlier: height, weight, stature score and BMI. The mean heights of the criminals are within an inch of the general male population mean, both as a whole and when broken down by ethnicity. Interestingly, the mean heights of the criminals exceed the mean heights of the civilians in each ethnic category; however, when examined as a whole, the criminal population mean is slightly lower than the national average. This is due to the overrepresentation of Hispanics in the criminal population; adult male Hispanics are on average three inches shorter than African American and Caucasian men (NHANES, 1999-2000), so their excessive presence in the criminal population drives the overall average down (Figure 6).

The average criminal weights, on the other hand, show a marked disparity from the national average. Whereas the average weight for an American male is 189.8 pounds, the average criminal weight is 174.96 pounds. Each ethnic group shows a substantial

Figure 6. **Average Heights**
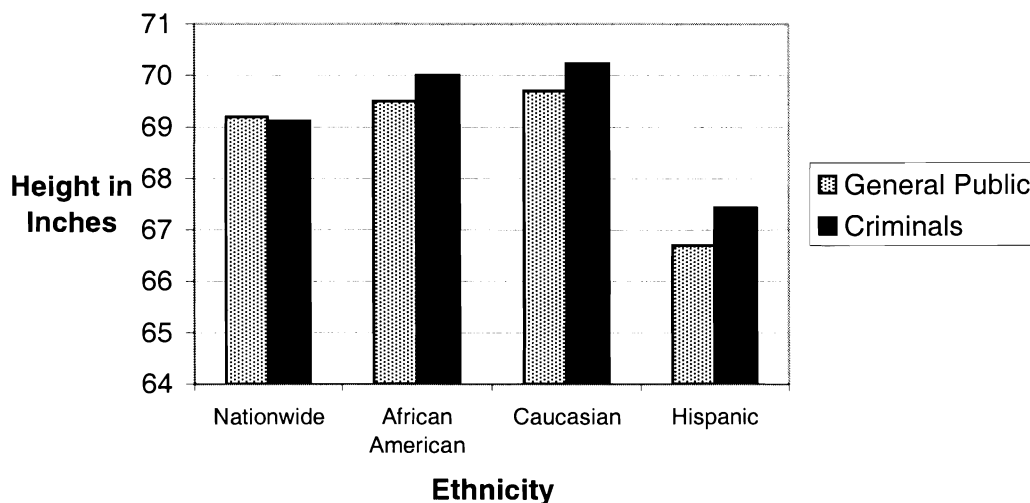


disparity as well, although none as dramatic as the approximately fifteen pound disparity

of the whole criminal population compared to the national average. As with the heights,

the overrepresentation of Hispanics, who are on average 11.9 pounds less than

Caucasians and 16.4 pounds lighter than African Americans (NHANES, 1999-2000),

causes the overall average criminal weight to decrease (Figure 7).

The median weight for the criminal sample is 170 pounds, compared to its

average of roughly 175. Nationally, however, the median weight for males is 176,

compared to the average of roughly 190. The five pound disparity between the mean

and median weights in the criminal sample indicates the distribution is right skewed;

comparatively, though, the disparity between the national mean and median is roughly 14

pounds, suggesting the national distribution is more severely skewed. The importance of

this finding is that the national population has a significant portion of people with

extreme weights on the high end, which the criminal population is lacking. Essentially,

the heaviest men in the country are substantially underrepresented in the criminal

population.

Figure 7. **Average Weights**
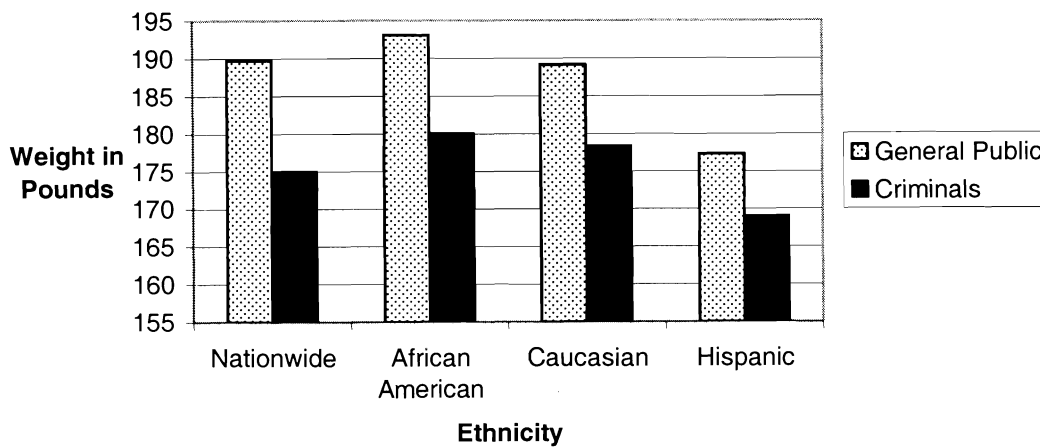


With the criminal population being, on average, taller and lighter than civilians in

each ethnic group, it is no surprise that the average BMIs are strikingly different. Since

BMI measures a person's weight relative to his or her height, these taller, slimmer men

are going to have reduced BMIs when compared to the national figures. Nationally,

32.8% of men have BMIs in the healthy range, 39.7% are overweight but not obese, and

27.5% can be classified as obese. In the criminal population, 47.9% are healthy, 38.1%

are overweight, with only 14% considered obese (Census 2002, NHANES, 1999-2000),

(Figure 8).

## Figure 8. **Criminal and Civilian BMIs**
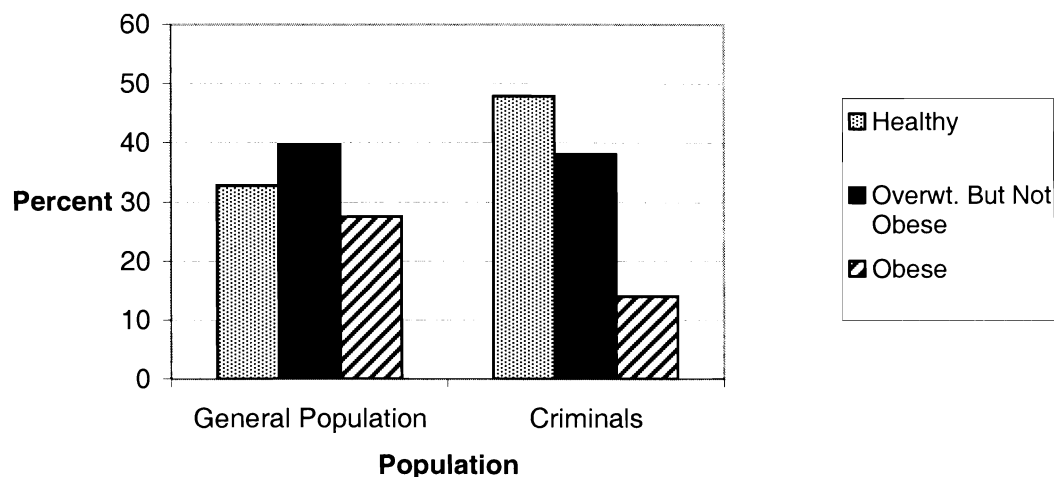


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Within each ethnic group, similar disparities can be found. Nationally, 60.7% of African American men, 67.4% of Caucasian men, and 74.7% of Hispanic men are overweight, compared to the criminal population, whose percentages of overweight men are 51.4%, 49.1%, and 56.6%, respectively (Figure 9).

Since the fourth measure, stature score, is created by the author, there are no national figures in publication. Moreover, accurate figures cannot be derived by doing calculations on the average heights and weights in each ethnic group; making calculations on the averages does not yield the same outcome as averaging the individual calculations. For this reason, stature score will be used to make comparisons among criminal populations, but not to compare criminals with the general public.

Figure 9. **Percent of Males Overweight**
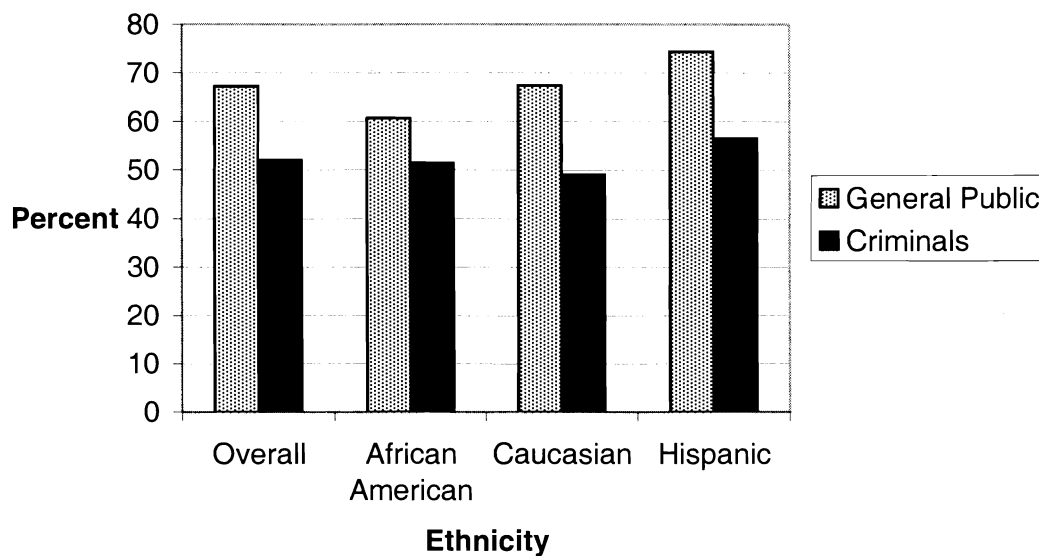


**4.2 Comparisons by Locality**

Each criminal is classified as being from an urban or suburban/rural setting; this is based on where the crime is committed, not where the criminal resides. In the sample of 4488 criminals, 1675 come from urban settings, and 2813 are classified as suburban/rural.

The center of the distribution for height of men who commit crimes in urban settings is lower than that of men whose crimes are in the suburbs or rural areas (P-Value <.001). Their weights, however, are not statistically different. Consequently, the distribution center of the stature scores for men in urban areas is smaller (P-Value = .036) since these figures are a product of a reduced height multiplied by a similar weight. BMI, on the other hand, has a higher distribution center for men in urban areas (P-Value <.001), since they average shorter than criminals in suburban and rural areas, but equally as heavy (Table 1).

Table 1.  **Urban vs. Suburban/Rural**

|  | Z-Score | P-Value |
|---|---|---|
| **Height** | −7.336* | <.001* |
| **Weight** | −0.537 | 0.591 |
| **Stature Score** | −2.101* | 0.036* |
| **BMI** | 3.499* | <.001* |

*Indicates a statistically significant value ( $\alpha$ =.05)*

## 4.3 Types of Crimes

Men who commit Index crimes have a weight distribution center which is slimmer than Non-Index criminals, with no significant height differences emerging.  As a result, their stature scores and BMIs have lower centers as well (Table 2).

Table 2.  **Index vs. Non-Index**

|  | Z-Score | P-Value |
|---|---|---|
| **Height** | -.760 | .447 |
| **Weight** | -4.090* | <.001* |
| **Stature Score** | −3.608* | <.001* |
| **BMI** | −3.958* | <.001* |

*Indicates a statistically significant value ( $\alpha$ =.05)*

## 4.4 Comparisons Among Index crimes

Men who commit index crimes have been found to have lower distribution centers for weight, stature score, and BMI than the non-index criminals; however, stature varies within the index category itself.  In this section, each index crime is compared to the other index crimes, as well as the criminal sample as a whole, to determine if any significant shifts exist between the distribution centers.  This first comparison is between

individual index crimes and the rest of the entire sample. In each column of the Table 3, a negative Z-Score implies that the men in that category have a lower distribution center than the general criminal population.

Table 3. **Index Crimes vs. All Others**

| | **Murder** | | **Property** | | **Rape** | | **Assault** | | **Robbery** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Z-score | P-Value | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value |
| **Height** | −8.378* | <.001* | 7.438* | <.001* | −1.735 | 0.080 | 0.452 | 0.651 | 0.555 | 0.579 |
| **Weight** | −6.344* | <.001* | 0.545 | 0.586 | 0.084 | 0.933 | −0.183 | 0.855 | −0.212 | 0.832 |
| **Score** | −7.311* | <.001* | 2.144* | 0.032* | −0.279 | 0.780 | −0.070 | 0.944 | 0.073 | 0.941 |
| **BMI** | −2.088* | 0.037* | −3.390* | 0.001* | 1.104 | 0.270 | −0.476 | 0.634 | −0.878 | 0.380 |

*Indicates a statistically significant value ( $\alpha$ =.05)*

Murderers have a lower distribution center than the other criminals in every category including BMI, which means they average slimmer for their height than other criminals. Men who commit property crimes have higher distribution centers for height but no difference for weight, resulting in a higher stature score and a reduced BMI. No statistically significant shifts occur in the distributions from other categories (Table 3).

When comparisons are made among index crimes only, murder is once again the only crime which has a significantly lower distribution center for both height and weight when compared to the other criminals. The distribution centers for men who commit property crimes are higher for height and marginally higher for weight when compared to the perpetrators of other index crimes; rapists have a significantly higher BMI distribution center, although neither the height nor weight showed any significant differences when examined specifically. No other significant differences can be found among the groups (Table 4).

### Table 4. Index Crimes vs. Other Index Crimes

| | Murder | | Property | | Rape | | Assault | | Robbery | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value |
| **Height** | −8.777* | <.001* | 8.056* | <.001* | −1.522 | 0.128 | 0.949 | 0.343 | 0.572 | 0.567 |
| **Weight** | −5.426* | <.001* | 1.921† | 0.055† | 1.246 | 0.213 | 1.716 | 0.086 | 0.437 | 0.662 |
| **Score** | −6.657* | <.001* | 3.448* | 0.001* | 0.736 | 0.462 | 1.652 | 0.099 | 0.610 | 0.542 |
| **BMI** | −0.874 | 0.382 | −2.283* | 0.022* | 2.242* | 0.025* | 1.299 | 0.194 | −0.233 | 0.816 |

*\* Indicates a statistically significant value ( $\alpha$ =.05)       †Indicates marginal significance*

Each index crime is also compared to the others on an individual basis. In the following tables, the crime named in the title is being compared to the others; a negative Z-Score in a particular column indicates the men in the crime from the title have a lower distribution center than the men who commit the crime mentioned in the column heading. For instance, in table 5 murderers have a lower distribution center than rapists in every category.

### Table 5. Murder vs. Other Index Crimes

| | Property | | Rape | | Assault | | Robbery | |
|---|---|---|---|---|---|---|---|---|
| | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value |
| **Height** | −10.029* | <.001* | −3.767* | <.001* | −6.313* | <.001* | −4.136* | <.001* |
| **Weight** | −4.438* | <.001* | −3.705* | <.001* | −4.454* | <.001* | −2.718* | 0.005* |
| **Score** | −6.088* | <.001* | −3.994* | <.001* | −5.256* | <.001* | −3.414* | <.001* |
| **BMI** | 0.877 | 0.380 | −2.041* | 0.041* | −1.188 | 0.235 | −0.198 | 0.843 |

*\* Indicates a statistically significant value ( $\alpha$ =.05)*

As evidenced in table 5, the distributions of men who commit murder are comparable to assault and robbery only for BMI; in every other instance the distribution centers are significantly lower for murderers than the other categories.

Table 6.  **Property Crimes vs. Other Index Crimes**

| | Rape | | Assault | | Robbery | |
|---|---|---|---|---|---|---|
| | Z-Score | P-Value | Z-Score | P-Value | Z-Score | P-Value |
| **Height** | 5.568* | <.001* | 4.787* | <.001* | 2.548* | 0.011* |
| **Weight** | 0.216 | 0.829 | 0.350 | 0.726 | 0.385 | 0.700 |
| **Score** | 1.402 | 0.161 | 1.368 | 0.171 | 0.854 | 0.393 |
| **BMI** | −2.741* | 0.006* | −2.130* | 0.033* | −0.757 | 0.449 |

*indicates a statistically significant value ( $\alpha$ =.05) $\alpha$*

Table 6 suggests property criminals have higher distribution centers for height than the other index criminals, creating a significantly reduced BMI when compared to rapists and assaulters.  The height difference when compared to robbers is not substantial enough to result in a significantly reduced BMI.

Table 7.  **Assault vs. Other Index Crimes**

| | Rape | | Robbery | |
|---|---|---|---|---|
| | Z-Score | P-Value | Z-Score | P-Value |
| **Height** | 1.763 | 0.078 | −0.320 | 0.749 |
| **Weight** | −0.046 | 0.963 | 0.109 | 0.914 |
| **Score** | 0.308 | 0.758 | −0.118 | 0.906 |
| **BMI** | −1.067 | 0.286 | 0.586 | 0.557 |

*Indicates a statistically significant value ( $\alpha$ =.05)*

No statistically significant differences exist between the assault distribution and rape or robbery distributions, as evidenced by table 7.

Table 8. **Rape vs. Other Index Crimes**

| | **Robbery** | |
| | Z-Score | P-Value |
|---|---|---|
| **Height** | −1.421 | 0.155 |
| **Weight** | 0.133 | 0.894 |
| **Score** | −0.276 | 0.782 |
| **BMI** | 1.309 | 0.191 |

*Indicates a statistically significant value ( $\alpha$ =.05)*

The distribution centers from men who commit rape do not significantly differ from those who commit robbery (Table 8).

The actual mean and median values from the sample are listed in the table 9:

Table 9. **Empirical Measures**

| | **Height** | | **Weight** | | **Score** | | **BMI** | |
| | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
|---|---|---|---|---|---|---|---|---|
| **Murder** | 68.1 | 68 | 167.5 | 160 | 11.5 | 11.0 | 25.4 | 24.5 |
| **Property** | 69.9 | 70 | 175.7 | 170 | 12.3 | 11.9 | 25.3 | 24.4 |
| **Robbery** | 69.3 | 69 | 172.9 | 170 | 12.0 | 11.9 | 25.4 | 24.5 |
| **Rape** | 68.9 | 69 | 175.2 | 170 | 12.1 | 11.7 | 25.9 | 25.2 |
| **Assault** | 69.2 | 69 | 174.7 | 170 | 12.1 | 11.7 | 25.7 | 25.1 |
| **Part II** | 69.2 | 69 | 176.8 | 170 | 12.3 | 11.9 | 26.0 | 25.2 |
| **Criminals** | 69.1 | 69 | 175.0 | 170 | 12.1 | 11.7 | 25.7 | 25.1 |
| **National** | 69.2 | 69.1 | 189.8 | 176 | | | 26.7 | |

## 4.5 Comparisons with Prison Populations

One of the hypotheses of this study is that perhaps there is a relationship between small stature and imprisonment in this country. However, when compared by percentile, the heights of the criminal population align with the civilian population. When comparing the weights in a similar fashion, the evidence does not support the hypothesis as it is stated. The lightest men are not overrepresented in the criminal population; however, the heaviest men are underrepresented, as stated in section 4.1. The 95th percentiles for civilian weight, in most cases, fall above the 95% confidence interval for the 95th percentile for criminal weight, as evidenced by table 10.

Table 10. **95th Percentiles for Weight**

|                  | Country* | Criminal† |
|------------------|----------|-----------|
| **African American** | 266.2 | 240-253 |
| **Caucasian**        | 250.8 | 200-245 |
| **Hispanic**         | 233.3 | 220-235 |
| **Other**            | 250.8 | 210-240 |

*(NHANES 1999-2000)*   *† 95% Confidence Interval for 95th percentile*

# 5. CONCLUSIONS AND FURTHER CONSIDERATIONS

## 5.1 Conclusions

On average, American male criminals do not differ in height when compared to the civilian male population, but their mean weights are substantially lower. As a result, criminals have lower mean BMIs, and the percentages of overweight and obese criminals are markedly lower than those of the general population. In addition, the evidence suggests the heaviest men in the country are considerably underrepresented in the criminal population.

When comparing each individual index crime against all other crimes in the sample, murderers have lower height and weight distribution centers than the rest of the criminals. No other distinctions can be made. When examining only index crimes, murder is the only group which has distribution centers emerging smaller in all four categories. The height distribution center for men who commit assault is lower than the others, resulting in a higher BMI center, while the center of the height distribution for robbers significantly higher. The most striking finding, however, is the reduced

distribution centers for murderers when compared to other criminals who, as a whole, already average slimmer than the general population.

## 5.2 Comparisons with the Prison Population

Small stature does not appear to be related to the racial disparity in today's prisons. The shortest and slimmest men in each ethnic group are not overrepresented in the criminal population. The heaviest men do emerge as underrepresented in each ethnic group, but that is across the board and not in accordance with the imbalanced ethnic percentages in America's prisons. If small stature were a factor in the ethnic disparity, Hispanic men would be the group most heavily overrepresented in prison; currently, African American men are the most frequently incarcerated per capita.

## 5.3 Further considerations

More research into the small stature of murderers should be considered. Perhaps there is a psychological reason for the excessive presence of such behaviors in shorter, slimmer men; perhaps low socio-economic status results in both poor nutrition and violent behavior. Future studies should try to determine why this relationship exists; ultimately, the more knowledge we have about the motivation behind such criminal activity, the more we can do to prevent it.

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## VITA

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