A93 What Stature and Weight Do We Actually Estimate?

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After attending this presentation, attendees will understand the type of body size (reported versus cadaver size) to which estimates by commonly used regression equations are most closely related.

This presentation will impact the forensic science community by investigating and quantifying the relationship between estimated body size and reported/cadaver size in contemporary Americans. This information will assist forensic investigators and researchers in selecting body size estimation methods appropriate for their casework and research.

In forensic anthropology, the primary purpose of body size estimation is identification of unknown skeletal remains. Thus, the emphasis is generally placed on estimating victims' body size *at the time of death*. Various estimation methods have been devised based on different types of body size (e.g., living stature/weight, cadaver-adjusted living stature, reported stature/weight), and they are frequently believed to be estimating living or reported size; however, how accurate or biased the results they produce are in terms of the reported and cadaver size, which are likely to represent one's body size at the time of death, have not been systematically tested. In this study, the estimates from the commonly used methods are compared to reported and cadaver size to see if they actually represent living stature/weight or other types of size.

Forty-three American White skeletons (23 males and 20 females) in the W.M. Bass Donated Skeletal Collection, University of Tennessee, were used. Statures of the donations were estimated using the anatomical method (Raxter et al., equation 1), Ousley (femur equation), and Trotter and Gleser (femur equation).[1-3] Weights were also estimated using the morphometric method (Ruff et al.), McHenry, and Grine et al.[4-7]. Then, the bias between estimates and reported/cadaver size (Σ(cadaver or reported size – estimated size/n)) was calculated.

Stature estimates tended to be closer to cadaver stature than reported stature. The only exception was the Ousley's female equation that yielded less-biased estimates for reported stature (bias of -0.24cm and -1.13cm for reported and cadaver stature, respectively).[2] As far as cadaver stature is concerned, the anatomical method and Ousleys equation produced least-biased results for females and males, respectively (bias of -0.38cm and -0.29cm, respectively).[2] Estimates closest to reported stature were obtained by Ousley's equations for both sexes (bias of -0.24cm and 1.93cm for females and males, respectively).[2] Trotter and Gleser tended to underestimate cadaver stature (bias of 3.12cm and 2.01cm for males and females, respectively).[3] Considering that cadaver stature is reportedly 2.5cm larger than living stature, Trotter and Gleser appear to estimate living stature with least bias.[3] All the weight equations underestimated both cadaver and reported weight. Like the stature equations, smaller bias was produced when cadaver weight was estimated compared to reported weight. The least-biased cadaver weights were obtained from the morphometric method and Ruff et al. for males and females, respectively (bias of 5.26kg and 4.33kg, respectively).[5] When estimating reported weight, Ruff et al.'s equations performed best for both sexes, but the bias reached up to 14.74kg and 6.78kg for males and females, respectively.[5] McHenry's equation turned out to produce most biased results among the weight equations.[6]

Stature and weight equations produce estimates of differential degree of bias depending on the type of body size (reported versus cadaver). Once forensic investigators and researchers decide the type of body size based on their purpose, the most appropriate equations should be chosen based on the degree of bias associated with the size type.

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Body Size Estimates, Reported Size, Cadaver Size