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BODY BUILD AND BODY WEIGHT IN 25-YEAR-OLD ARMY MEN

BY ROBERT M. WHITE

Quartermaster Research and Development Center
Natick, Massachusetts

THE variability of body weight and its general relationship with stature is a familiar phenomenon in human biology. However, the problem of the effect of the size of the frame upon variability in body weight among men of the same stature is one which certainly merits further examination. The following material represents an attempt to investigate this question by considering the factor of laterality in body build.

The basic material utilized in this analysis was taken from anthropometric data collected by the U. S. Army Quartermaster Corps in 1946. At that time, body measurements were obtained on approximately 85,000 soldiers who were being separated from the Army during the demobilization process.

In order to eliminate the variability of weight with age, the sample was limited to men in the 25-year-old group. A series of approximately 3550 American-born White males was available for this analysis. The data actually utilized, however, were based on a series of approximately 2650 men. Body weights in this series are nude weights; stature was taken without shoes, and the body measurements were taken without clothing.

In this group, the total range of stature is from 59 to 77 inches; owing to small numbers of men at the extremes, a stature range of from 62 to 75 inches was selected for analysis. Body weight in this group varies between 100 and 270 pounds. The frequency distribution of stature in the series is normal, while the frequency distribution of weight shows the characteristic skewness to the right. Mean stature for this group is 68.6 inches, with a standard deviation of 2.4 inches, while mean weight is 157.0 pounds with a standard deviation of 20.7 pounds. The coefficient of correlation between stature and weight is +.451.

The available anthropometric data include several body diameters, as well as circumferences. Since it was felt that a diameter would offer a better measurement of laterality than a circumference, bi-deltoid, chest breadth, chest depth, and bi-iliac diameters were selected for consideration. Of these, the chest breadth and bi-iliac diameters seemed to offer the most promise since they are diameters taken between points on the bony framework of the body and are affected less by intervening fat. These two diameters were taken with an anthropometer, with pressure being applied.

A bi-variate distribution of stature and chest breadth diameter was then prepared. Mean chest breadth for this series is 11.2 inches, with a standard deviation of .8 inches, while the coefficient of correlation with stature is +.271. A regression line, derived from the regression equation of chest breadth on stature was plotted on the bi-variate chart. With this regression line as a base, the frequency distribution of chest breadth was divided into three groups by utilizing the probable error of the regression. These three groups may be taken to represent men with small, medium, and large chest breadths in a 25, 50, and 25% ratio.

The mean body weight was then calculated for the small, medium, and large chest breadth groups for each inch of stature. There was considerable variation in these means of body weight; the medians showed even more variability. In an attempt to reduce some of this variability, separate bi-variate distributions of stature and weight were prepared for the small, medium, and large chest breadth groupings. Values for weight calculated from the regression equation of weight on stature for the three groupings of chest breadth are belived to be more consistent and reliable than the simple means.

A similar analysis was carried out with the data for stature and bi-iliac diameter. The mean bi-iliac diameter for this series is 11.4 inches, with a standard deviation of .8 inches, and the coefficient of correlation with stature is +.336, slightly higher than that of chest breadth. As in the case of chest breadth, values of weight for groups of small, medium and large bi-iliac diameters for each inch of stature were obtained.

The results from these two analyses are shown in table 1. This table gives 6 mean weights for each inch of stature between 60 and 78 inches;

one for each group representing small, medium, and large chest breadths, and similarly one for each group representing small, medium, and large bi-iliac diameters. Since the analyses were based upon stature data between 62 and 75 inches, the weight values for 60, 61, 76, 77 and 78 inches of stature have been extrapolated. The limits of the chest

TABLE 1

Mean weights of 25-year-old army men (pounds)

STATURE (inches)	CHEST BREADTH Small	Medium	Large	BI-ILIAC DIAMETER Small	Medium	Large
60	115	127	141	121	125	136
61	118	130	145	124	129	140
62	122	134	148	127	132	144
63	125	137	152	130	136	147
64	128	141	156	133	139	151
65	132	144	160	136	143	155
66	135	148	163	140	147	159
67	138	151	167	143	150	162
68	142	154	171	146	154	166
69	145	158	174	149	157	170
70	148	161	178	152	161	173
71	152	165	182	155	164	177
72	155	168	185	158	168	181
73	158	172	189	162	171	184
74	162	175	193	165	175	188
75	165	179	197	168	179	192
76	168	182	200	171	182	196
77	172	186	204	174	186	199
78	175	189	208	177	189	203

breadth groupings for 60 inches of stature are: small, below 10.0 inches; medium, 10.0 to 11.0 inches; and large, above 11.0 inches of chest breadth. At 78 inches of stature, the limits are: small, below 11.5 inches; medium, 11.5 to 12.5 inches; and large, above 12.5 inches. Similarly the limits of the bi-iliac groupings for 60 inches of stature are: small, below 9.9 inches; medium, 9.9 to 11.0 inches; and large, above 11.0 inches, while at 78 inches of stature, the limits are: small, below 11.9 inches; medium, 11.9 to 13.0 inches; and large, above 13.0 inches.

For many years, tables of "ideal" or "desirable" weights have been published by insurance companies, based upon medico-actuarial studies of large series of insured individuals. A table of this type, published by the Metropolitan Life Insurance Company of New York, is entitled, *Desirable Weights for Men age 25 or Over*. This table represents minimum and maximum weights for men with small, medium, or large frames, for each inch of height between 62 and 75 inches. The range of weight for each inch of stature and each type of frame is approximately 10 or 12 pounds. In this table, weights are given "as ordinarily dressed," and heights are given "with shoes." The small, medium, and large frame categories are not defined.

The Army data indicate slightly higher weights for men with small bi-iliac diameters than for men with small chest breadths; in the medium body build group, weights are virtually the same for chest breadth and bi-iliac diameter; while in the third group, weights are higher for men with large chest breadths than for men with large bi-iliac diameters. The maximum figures for weight in the small, medium and large frame categories of the Metropolitan table come close, in general, to the mean weights based upon the bi-iliac diameter of the 25-year-old Army men. In any case, the area bounded by the lower and upper limits of weight in the Metropolitan table fell within limits indicated by lines representing one probable error above and below the line of mean weights, based upon either chest breadth or bi-iliac diameter.

In addition to the investigation of the effect of laterality on body weight, involving chest breadth and bi-iliac diameter, another phase of the present study consisted of a similar analysis based upon trunk height. The trunk measurement is essentially sitting height less the head and neck, and represents the length of the trunk or torso of the body. In the present series, mean trunk height is 23.1 inches, with a standard deviation of 1.1 inches, and the coefficient of correlation with stature is +.602. The same procedure as described above was followed for the analysis of trunk height, with the following results. Owing to the comparatively high positive correlation between trunk height and stature, the three groupings of trunk height, through use of the probable error of the regression, were not nearly as well-defined as in the case of the diameters. The mean weights which were then calculated for the small, medium, and large trunk height groups were also quite irregular. It may be concluded, therefore, that a preliminary investigation of the relationship between trunk height and stature indicated that a length measurement, such as trunk height, is not as satisfactory for the consideration of variability in body weight as is a diameter.

In summary, an analysis of weight and body build was carried out on a series of approximately 3550 25-year-old White Army separatees. For each inch of stature, mean weights are presented for small, medium, and large groupings of chest breadth and bi-iliac diameter.

The material presented in this paper represents only a preliminary investigation of the problem of laterality in body build. However, the weights presented in table 1 are those for definite categories of body size as determined by the use of chest breadth and bi-iliac diameters.

The weights shown in the Metropolitan Life Insurance table, although they approximate fairly closely the Army values, are for categories of body size in which the determination of the size of the frame is not specified or defined in terms of any body diameter.

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