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To the Editor:
Dear Sir,

STRENGTH TRAINING AND CROSS-SECTIONAL AREA OF MUSCLES

As my friend Dr. R. J. Maughan pointed out in his recent paper in the Journal (Maughan, Watson and Weir, 1984) any discussion of the effect of training on the relationship between the strength and the cross-sectional area of a muscle should take into account the effect of changing the angle of pennation of the muscle fibres. In his discussion Dr. Maughan refers to his finding that, in untrained subjects, an inverse relationship exists between the strength/cross-sectional area ratio and the cross-sectional area of the quadriceps (r = -0.55). This apparent relationship is, however, an artefact. Significant inverse correlation will always found between A/B and B.

To demonstrate this point, I used the Random Number Generator programme of a Texas Instruments TI-59 calculator to produce 35 pairs of numbers. One of each pair was drawn from a hypothetical, normally distributed, population with mean = 742 and standard deviation = 100 (i.e. corresponding to Maughan's untrained subjects' strength measurements). Similarly, the other number in each pair was generated as though it was derived from a normally distributed population with mean = 81.6 and standard deviation = 11.8 (i.e. corresponding to Maughan's subjects' cross-sectional area data). Calculation of the correlation coefficient for the relationship between these random values for strength/cross-sectional area and cross-sectional area confirmed the expected, highly significant, negative correlation (r = -0.77).

Although Maughan's data are interesting and valuable, part of his interpretation is founded on a spurious relationship.

Yours sincerely,
Archie YOUNG

Reference