Student 2: High Merit

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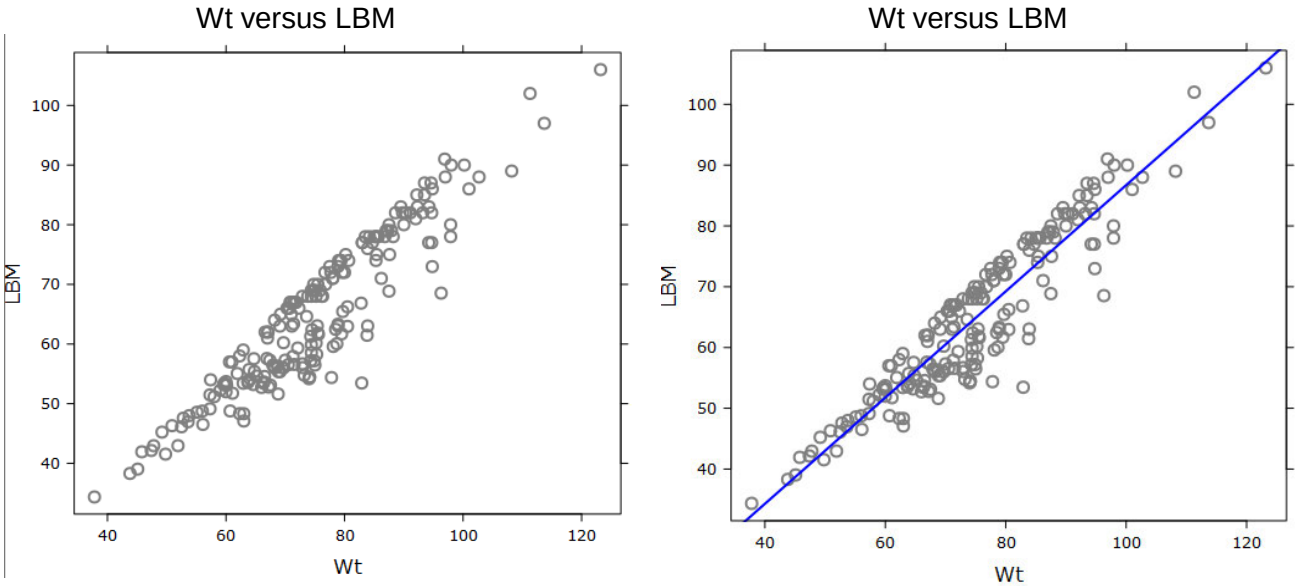
Using the data set provided from the Australian Institute of Sport I will look at different pairs of variables to quickly see the kinds of relationships that there might be. I have decided to investigate the relationship between weight and lean body mass.

Investigative question: I wonder if there is a relationship between weight in kg and lean body mass in kg in males and females that play sports? (1)

According to the Journal of Romanian Sports Medicine Society[1] body composition is a factor contributing to sport performance and the assessment of body composition is an important component of the on-going monitoring of athletes interested in improving their performance. Lean body mass (LBM) is how much you weigh without your body fat so I expect that there will be some relationship. Without the body fat you should be able to get an idea of how much muscle you are gaining or losing as a result of training and diet. LBM is fairly easy to calculate once you have weighed yourself and figured out your body fat percentage. You just calculate your body fat in kg and subtract that from your body weight. Weight in kg is the explanatory or independent variable and LBM in kg is the response or dependent variable.



From the first graph it seems that there is a positive linear relationship between the weight and LBM of an athlete and there is no other evidence to suggest that a different model would be better. This is seen by how the data points on the graph are very close together and are increasing in a positive direction and are close to an imaginary linear trend line. This suggests that there is a strong relationship between the two variables. The relationship is also seen as positive due to the fact that the data seems to go upwards and increases. It seems that when weight in kg increases the lean body mass tends to increase for males and females that play a sport. There seems to be unusual values in the data. These are some values that are not so close to the main group of data these can be found in the range between the weights of 111kg to 124kg and the weight 38kg. (3)

When a trend line (LBM = 0.8737 * Wt - 0.6627) has been added to the graph it is visible from the positive gradient that there is a positive relationship and the points are scattered along the regression line quite closely, therefore there is a strong relationship between weight and LBM of athletes. The correlation coefficient (r) demonstrates the strength of the relationship between the two variables. This has a value of 0.9309 and confirms that there is a very strong, positive relationship because the value is very close to 1. The correlation coefficient expresses how close the points are to the trend line and in this case they are very close. (2)

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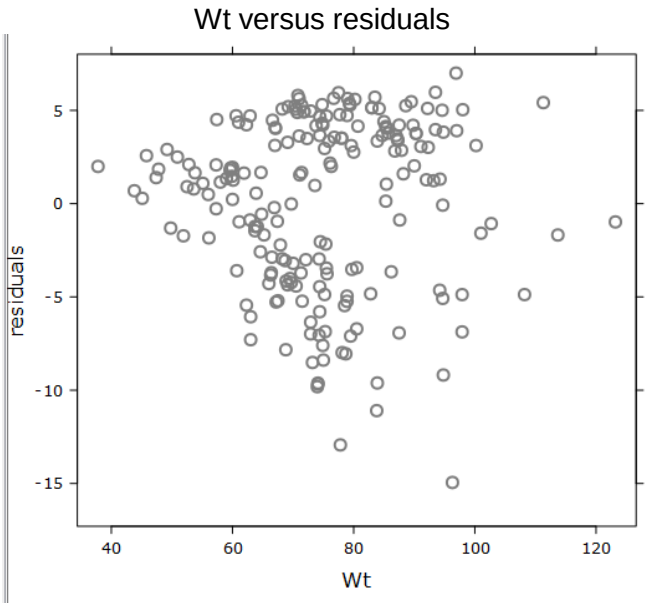

From this graph of residuals for weight in kg and lean body mass in kg it is visible that there is quite a spread of the points and no real pattern in them. About half of the points are positive and the other half are negative. The positive residuals go up to about 6 whilst the negative residuals go up to about -16.
This reinforces that a linear model is appropriate.

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The gradient of the linear trend line 0.8737 expresses that as the weight in kg for males and females that play a sport increase by 1kg, the lean body mass in kg tends to increase by 0.8737kg.

The model LBM = 0.8737 * Wt - 0.6627 is not useful for all values of the weight. For example the model predicts that a weight of zero will produce a negative lean body mass, and this does not make sense. We can't really use the model below weights of 38kg, the lowest weight in the data set.

Even though there appears to be a strong relationship between weight in kg and LBM in kg for athletes we cannot be sure that an increase in weight is completely responsible for an increase in LBM as there may be other factors involved that were not controlled in this investigation.

This data is for athletes at the Australian Institute of Sport and so may not represent data for typical Australian men and women or actually people outside of Australia. It might not represent athletes from other countries either.

In conclusion there is a relationship between the weight in kg and lean body mass in kg for males and females that play a sport and a linear model seems to suit this data best. I would expect this information to be useful to the coaches and trainers in their on-going monitoring of these athletes - as it could be used to get an idea of how much muscle the athletes are gaining or losing as a result of training and diet. It also might be useful to do an analysis of the weight and LBM of male and female athletes separately or to look at relationships for athletes from other countries.

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http://www.medicinasportiva.ro/SRoMS/english/Journal/No.6/The%20importance%20of%20body%20composition%20measurement%20at%20athletes%20and%20non%20athletes%20full.html

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