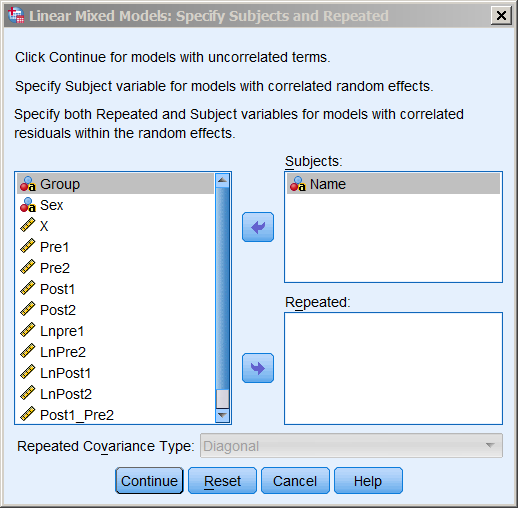
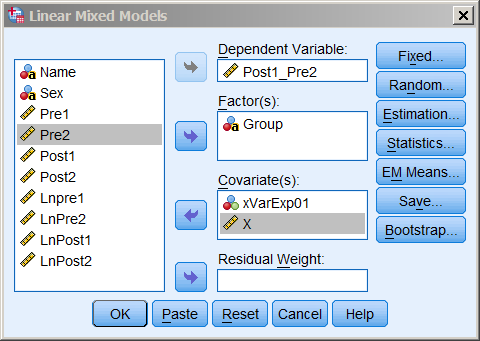
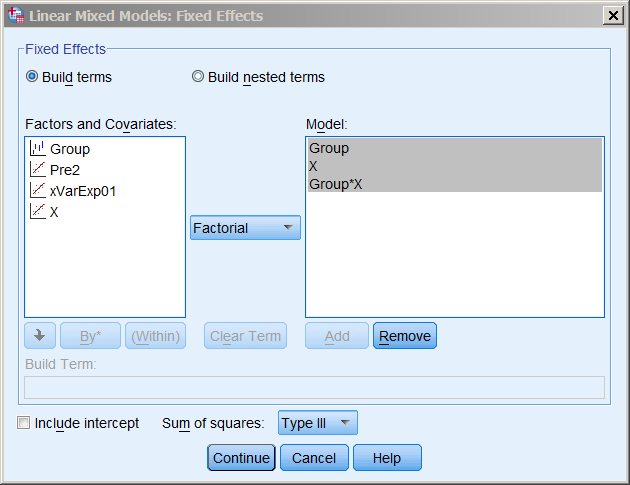
Import the Excel file "controlled trial ex Sportscience to import into SPSS.xlsx", and choose **Analyze/Mixed Models/Linear**. Make Name the **Subjects:**



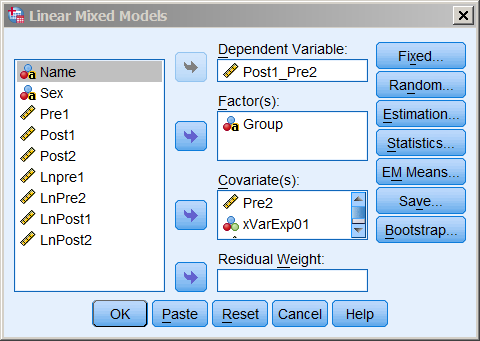
Choose these dependent variables, factors and covariates, then click **Fixed**:



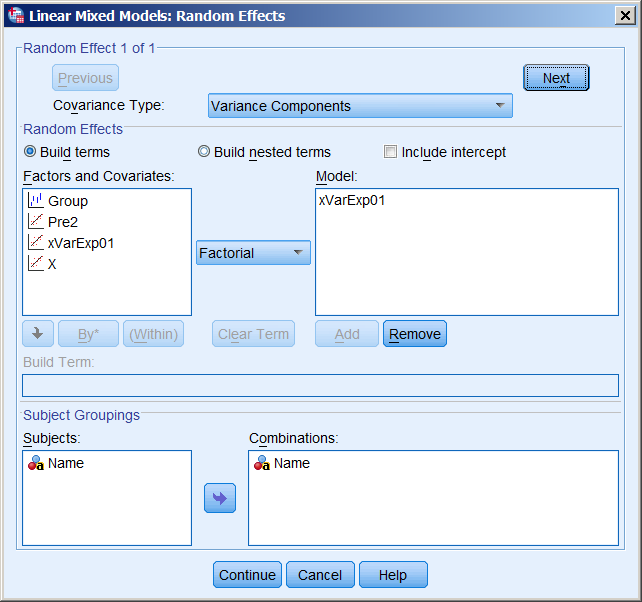
Now choose Group+X and Factorial (the default), and **Add**. You don't have to have X in the model. Without it, you get a slope for X for each group, which represents the modifying effect of X on the change score in each group. With it, you still get two slopes, but one is associated with X, and the other is the difference between the slopes. It's hard to explain! Try it both ways and you will see what I mean. The intercept doesn't matter. **Continue**.



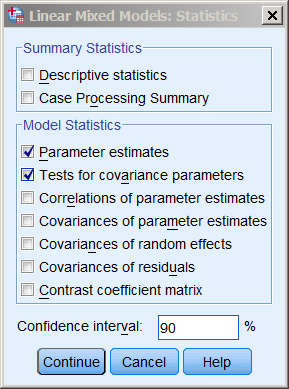
Click **Random**:



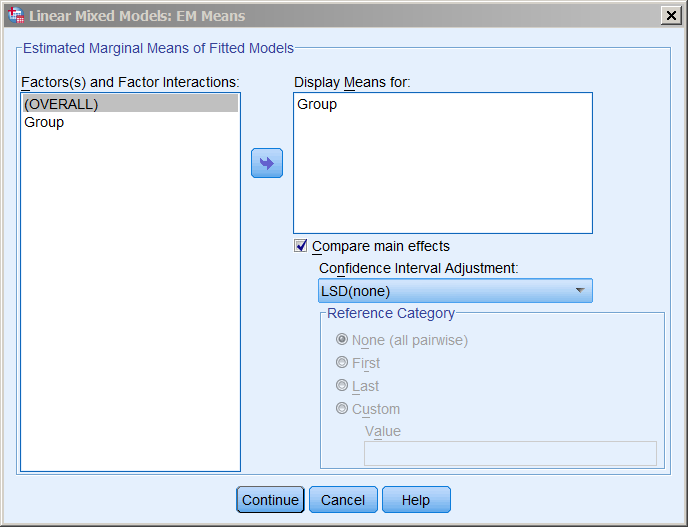
Choose the following. Note that you do NOT Include intercept. What we're doing here is adding a randomly chosen number to the change score for each athlete in the experimental group. That makes each number an individual response for each athlete in that group. The variance of those numbers is the statistic summarizing the individual responses. Click **Continue**:



Click **Statistics** and select the following:



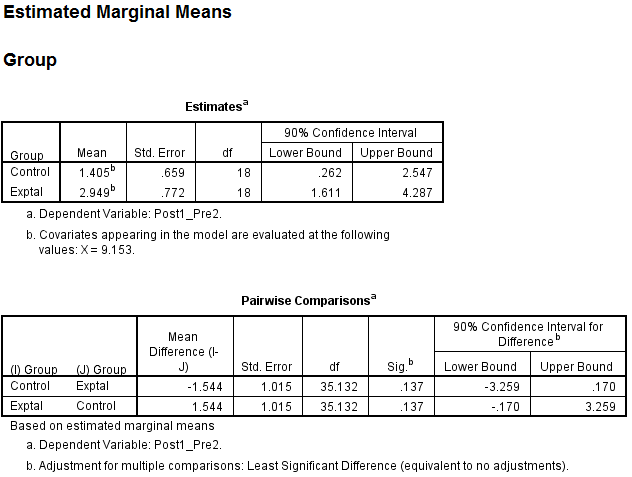
Click **Continue**, then **EM Means** and set this up, then **Continue**:



Then **OK**.

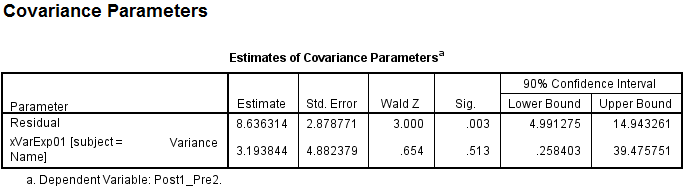
Let's take the output in order of interest.

First, the treatment effect comes from the Estimated Marginal Means. The mean change scores are in the first panel, and the comparison of the means is in the second:



Check these against the spreadsheet. I have highlighted all relevant cells in pale green The un-back-transformed means are underneath each block of change scores. You will have to look lower down where the analysis is done before back transformation to find the difference in the changes and the confidence limits. Naturally you have to do the back-transformation to convert the above to an exact percent effect, 1.5%.

Now the random effects:



The individual responses are the square root of 3.19, which comes to 1.8. Fine, but the square root of the confidence limits aren't the same as in the spreadsheet. The problem here is that SPSS will not allow negative variance, so it calculates confidence limits incorrectly, as if the variance had a chi-squared distribution rather than a normal distribution (the correct option). The chi-squared distribution is right for the Residual, but again it doesn't immediately agree with what's in the spreadsheet. The reason: SPSS is showing effectively the standard deviation of the change scores in the control group, but I have converted it to a typical error in the spreadsheet by dividing it by root(2).

So how do you get correct confidence limits for the individual responses? Fortunately SPSS provides a standard error (the stats package R does not, not when I checked last time a couple of years ago). You just use that standard error with a z score appropriate for 90% confidence limits, 1.65. Do it before you take the square root. Now the lower confidence limit is negative, so you have to change the sign before you take the square root, then make the answer negative. See the spreadsheet.

Finally the modifying effect of the covariate X… The spreadsheet does this too, but to see the slopes and the difference between the slopes you have to put something in Cell AA38. If you put the value 1 there you will get their difference as an effect. But read the comment in the adjacent cell Z38.