***Learning Statistics with R - University of Adelaide***

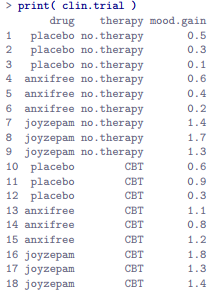
***Part V – Statistical Tools***

**14. Comparing Several Means (one-way ANOVA)**

* 1 of the most widely used tools in statistics = **the analysis of variance** = **ANOVA**.
* Basic technique = developed by Sir Ronald Fisher in early 20th century
* Term “ANOVA” is a little misleading, in 2 respects
* Although name refers to variances, ANOVA is concerned w/ investigating differences in means
* There are several different things that are all referred to as ANOVAs, some of which have only a very tenuous connection to one another.
* Range of different ANOVA methods that apply in quite different situations,
* Simplest form of ANOVA = several different groups of observations + are interested in finding out whether those groups differ in terms of some outcome variable of interest = **one-way ANOVA.**

**14.1 An illustrative data set**

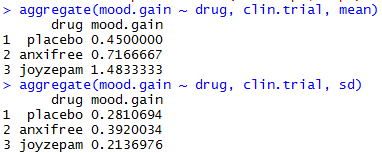
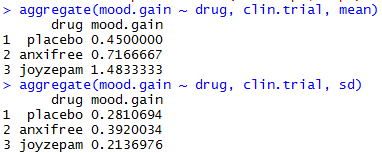
* Suppose you’ve become involved in a clinical trial in testing a new antidepressant drug Joyzepam.
* In order to construct a fair test of drug’s effectiveness, the study involves 3 separate drugs to be administered = yours, a placebo, an existing antidepressant/anti-anxiety drug Anxifree.
* A collection of 18 participants w/ moderate to severe depression are recruited for initial testing.
* B/c the drugs are sometimes administered in conjunction w/ psychological therapy, study includes 9 people undergoing cognitive behavioral therapy (CBT) + 9 who are not.
* Participants are randomly assigned (doubly blinded) a treatment, such that there are 3 CBT people + 3 no-therapy people assigned to each of the 3 drugs.
* A psychologist assesses mood of each person after a 3 month run w/ each drug + overall improvement in each person’s mood is assessed on a scale ranging from -5 to 5



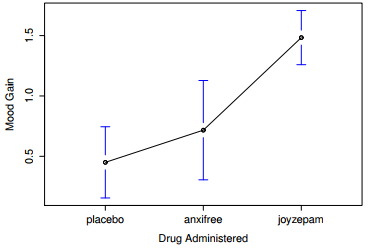
* Interested in the effect of drug on **mood.gain**
* **1st** first thing to do = calculate descriptive statistics + draw some graphs
* See how many people we have in each group:



* Calculate means + SDs for mood.gain variable broken down by drug



* Plot the average mood gain for all 3 conditions;



* Error bars show 95% CI’s
* As the plot makes clear 🡪 larger improvement in mood for Joyzepam participants than for either Anxifree or the placebo.
* Anxifree shows a larger mood gain than the control group, but the difference isn’t as large.
* The question that we want to answer is: are these difference “real”, or are they just due to chance?