Assignment 2.1: Power Analysis

There are 5 scenarios listed. For each scenario, use the information presented to conduct a power analysis to determine the minimum number of subjects needed for a study.

In order to conduct the power analysis, you will need to download and register for G\*Power 3 using the link provided. This is free software that will determine the power of a study using the information you provide. You will download a zip folder that contains an Installation text file; read this file for directions on how to install the program. From this link, you can also access User Guides to help you use the program successfully.

<http://www.psycho.uni-duesseldorf.de/abteilungen/aap/gpower3/download-and-register>

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

Use the “A priori: Compute required sample size (given α, power, and effect size)” as the type of power analysis. After you select the test family and statistical test, use the following input parameters for each scenario. Then click on the “Calculate” button of the lower Right hand corner. You will find the Total sample size in the Output Parameters box on the right side.

1. F test family: A researcher wants to use a one-way ANOVA (fixed effects). The researcher expects to find an effect size (f) of 0.25 using an error probability (α) of 0.05. He wants the power of his study to be 0.80. The research design includes 4 groups.
2. T-test family: Another researcher wants to analyze the correlation (point-biserial model) for a 1-tailed test with an expected effect size (ρ) of 0.35 using an error probability (α) of 0.05. She wants the power of her study to be 0.80.
3. F test family: A group of researchers wants to use linear multiple regression (fixed model, R2 increase). They expect to find an effect size (f2) of 0.05 using an error probability (α) of 0.01. They want the power of their study to be 0.85. Their model has 4 predictors and they are testing all 4 predictors in this model.
4. F test family: A group of researchers want to use a MANOVA (repeated measures, between factors). They expect to find an effect size of 0.18 using an error probability (α) of 0.05. They want the power of their study to be 0.80. The research design includes 4 groups and they are planning on having 8 separate measurement occasions. They anticipate the correlation among the repeated measures to be 0.15.
5. χ2 test family: A different group of researchers want to analyze the goodness-of-fit (contingency table) with an expected effect size (w) of 0.42 using an error probability (α) of 0.10. She wants the power of her study to be 0.80. They will use a 4 x 3 model which has 6 degrees of freedom (df).