Read the article by Gatsonis and Sampson and write me a brief statement covering the similarity and differences between the Fixed and Random regression models. What is the major conceptual difference? Also, your statement should discuss estimation, hypothesis testing, and power calculations. After writing the statement, compare the sample sizes need to detect a population multiple correlation **R of .4** (R^2 =.16) under the fixed and random models. Set alpha at .05 and power at .80, in your comparisons. Use G*Power for the calculations under the fixed model. Keep in mind that in G*Power $f^2 = R^2 /(1-R^2)$. Use the tables in the article to obtain the sample size for the random model. Make the comparison for 3 and 4 predictors. What do you notice?

Gastonis and Sampson describe the differences between the conditional and unconditional modeling approaches when estimating the power of a study. The major differences between the conditional and unconditional models are details in their treatment of the bias in the estimates. The conditional model assumes that the values for the independent variables cover the entire possible distribution; however, the unconditional model assumes that the distribution of the observed independent variables is pulled from a random distribution. This can also be thought of as error introduced by sampling, where the levels of the I.V. are going to be consistent across repeated experiments in the conditional framework, the I.V. may have new values in repeated tests performed in the unconditional framework.The two models are equivalent in their parameter estimates when the correlation amongst predictors is negligible. When the correlation amongst predictors increases the standard error in the fixed effect models decreases quicker than in the unconditional model increasing the possibility of type I errors. The structure of the hypothesis testing is identical where the null is assumed to be true, and the null is that the independent variables' beta weight are equal to zero for both model types.

Model Type	3 Predictors	4 Predictors
Unconditional	64	71
Conditional	62	67

The sample size requirements are relatively stable although consistently higher for the unconditional models. This is most likely due to the additional variance attributed by the sampling bias introduced with random effect predictors.