explanatory variable <=> outcome/responsive variable
the one that may explain or may cause difference in a responsive var

Randomized experiement: create differences in the explanatory variable and examine results.

Observational study: observe differences in the explanatory variable and notice whether these are related to difference in the responsive variable.

why using observational:
1. ethical considerational
2. some explanatory variables are inherent traits.

Confounding/Lurking: a variable that is not among the explanatory variable but may affect the outcome.

It is difficult to seperate the effect on the responsive variable between confounding variable and explanatory variable.
Confounding is a bigger problem in observational studies.

subject
↓
treatment { factor 1, factor 2, ⋮
↓
response.

uncontrolled experiment: an experiment that has confounding variables.

comparative experiment: having a similar unit receive same treatment
control group: receive a placebo or an existing baseline treatment.
A experiment that uses both comparision of two or more treatment and random assignment of subjects to treatment is a randomized comparative experiment.

Principles of Experiement Design:
1. Control: restrict the effect of lurking variables
2. Randomization: use chance to assign subject to treatments.
3. Replication: use enough subjects in group to reduce chance variation.

Statically significant: an observed effect so large that it would rarely occur by chance

placebo: no active ingredient
double-blind: neither the subject nor those who interact with them and measure the responsive know which treatment each subject is receiving.
single-blind: only one of two is blinded.