

PRACTICE III

1. A researcher wants to determine if watching TV from five feet or closer damages a person's eyes. The researcher wants to know if this is the truth or a myth.

- (a) How can an observational study be performed?

Interview a random of people as to whether or not they sit within five feet when watching TV and whether or not they have eye problems. Compare the proportion of people who sit within five feet of the TV who have eye problems to the proportion of people who sit in front of the TV that do not have eye problems.

- (b) How can an experiment be formed?

From a group of volunteers without eye problems, use chance to pick half to sit within five feet of the TV for some period of years while the remaining half are instructed to sit over 5 feet away from the T.V. for the same period, compare proportion of each treatment group who developed eye problems.

- (c) Which is more appropriate here? Explain.

The experimental approach is better than the observational approach, as the observational study may have confounding variables.

For example, perhaps those who choose to sit closer than 5 feet are those who already have eye problems. A observational study may be more appropriate as an experiment is extremely unethical here.

- (d) If an experimental design was implemented, give an ethical consideration that would cause the researchers to halt the experiment early

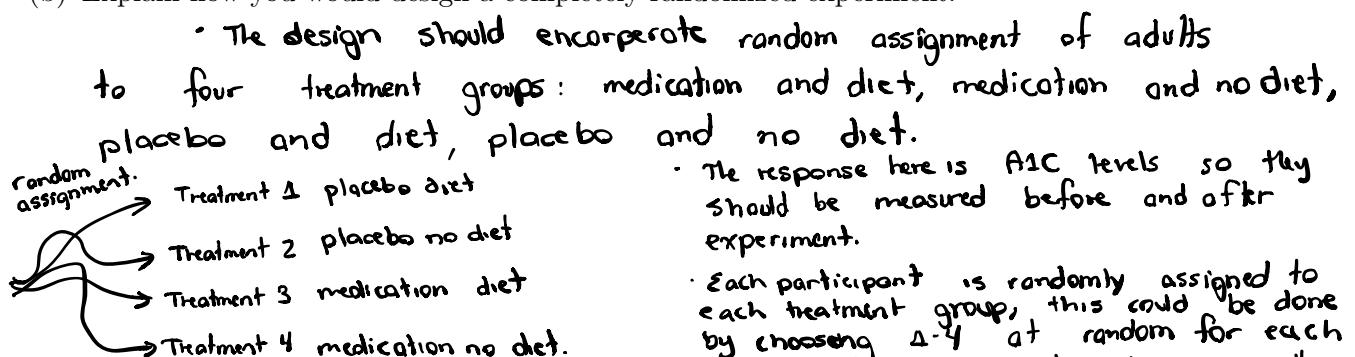
If the researcher notices that members of the group instructed to sit in front of the T.V. are coming down with eye problems faster than other group. Experiment is halted even if desired time hasn't been reached.

2. High A1C levels (a test for diabetes). can be reduced by either a low-fat diet or a medication such as metformin. Researchers would like to test the effectiveness of metformin and to note whether the effectiveness, if any, is enhanced by diet. A random sample of adults with high A1C levels, on no special diets, and not on medication, are recruited for a study.

- (a) Conclusions will apply to what population?

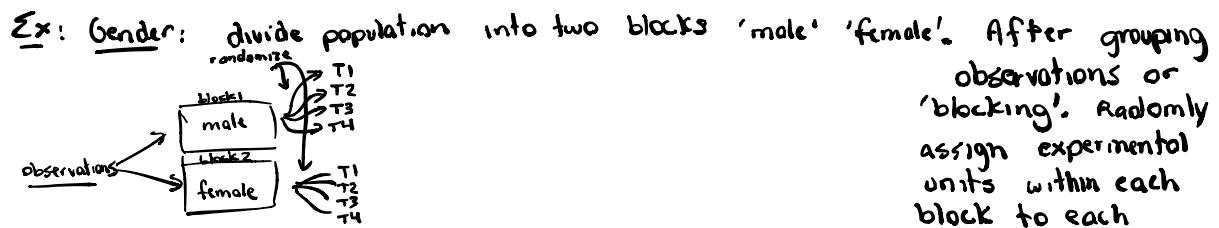
Because of random sampling, we should be able to generalize.
Conclusions will apply to adult nondieters with high A1C levels who are not taking medication.

- (b) Explain how you would design a completely randomized experiment.



- (c) How might you incorporate blocking and for what purpose?

Gender or Age may have an effect on A1C levels, these could be useful blocking variables.



- (d) How might blinding be incorporated in this study and for what purpose?

Blinding is incorporated through the use of a placebo. Some participants may be able to 'subconsciously' change A1C levels if they think they are taking metformin.

3. A company efficiency expert believes that employees who eat at least 1000 calories at breakfast have higher productivity levels at work. She interviews a random sample (SRS) of 30 employees who claim to eat under 1000 calories at breakfast and an SRS of 25 employees who claim to eat over 1000 calories at breakfast. In each group, she looks up productivity levels on the job.

- (a) Explain why this is an observational study and not an experiment.

- This is an observational study because no treatment is being imposed on anyone.

- (b) Give an example of a possible confounding variable with an explanation in the context of the study.

There are many possible confounding variables here. Perhaps not eating breakfast is linked with 'rushing-to-work,' which might be caused by lack of sleep. Is it lack of sleep causing response or breakfast, we are unsure these variables are confounded.

- (c) If the employees who eat over 1000 calories have higher productivity records, is it reasonable to encourage all employees to eat larger breakfast? Explain.

No, it is not reasonable. Cause-and-effect relationships cannot be drawn from observational studies.

- (d) How could the efficiency expert design an experiment to study caloric intake at breakfast with productivity in the workplace?

- Use random sampling to pick subjects for experiment. (For example, number employees from 1 to K for K employees, then generate desired sample from list using random number generator.)

- This will allow for generalization to all company employees.

- Use random assignment to place subjects into 2 treatment groups : ' >1000 ' , ' <1000 ' :

(have subjects pick cards without replacement.)

- One group is told to eat 1000 calories at breakfast, the other is told to eat less than 1000 calories at breakfast.
- Compare productivity records after a given time period.