Independent Variables, Subject Variables & Covariates

_____

- The "cause"
- Typically categorical
- Two or more "levels" or "conditions"
  - MUST have a comparison group
  - Ex. Training vs. No training

Types of Independent Variables

- _____
  - between-subjects
- _____
  - within-subjects
- Qualitative vs. Quantitative
- Treatment vs. Control

Other "Causal" Variables

- _____
  - Characteristics of the participants
- _____
  - Exists prior to research
  - Unethical or impossible to assign participants to conditions
- _____

Quasi-IV's vs. Subject Variables

- Quasi-independent variable
  - Participants "self-assigned" to condition
  - Treatment, Experience, Living Condition
- Subject variable
  - Demographics: gender, race, age
  - Personality traits: median split, extreme cases

Problems

- Most applied research involves a quasi-experimental design
  - Ex. One school has implemented an after school program and the other has not; students were not randomly assigned to conditions
- Less experimental control in quasi-experiments, so you cannot argue definite causality
- How would you fix this problem?

Solutions in Experiments

- Reducing _____in true experiments
  - Randomly assign p's to conditions so individual differences within groups average out
  - Treat each group exactly the same EXCEPT for the differences in the independent variable
  - Motto: Minimize error variance by making groups equal

Solutions in Quasi-Experiments

- Reducing _____in quasi-experiments
  - Participants are not randomly assigned
  - Difficult to know if outcome is based on the quasi-IV or something else (groups are probably not equal)
  - Motto: Minimize error variance by assessing possible confounding variables and incorporating those into your analysis
  - Solution: Use covariates

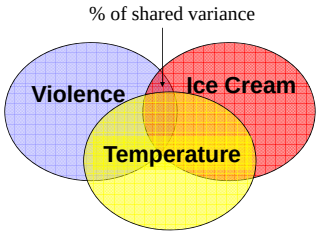
_____May Exist

- Other things can make company morale high or low, so you need to figure out if the training influences morale scores OVER AND ABOVE the degree to which these other factors are present
- So, what other factors could affect morale?

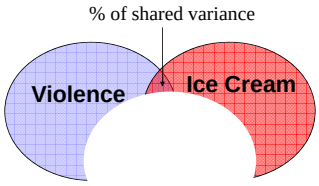
What does "_____" mean?

- Variance explained by a competing variable is held constant
- Ex. Violent crimes and ice cream sales
  - "Controlling for" regional temperature
  - Are ice cream sales related to violent crimes when the temperature is held constant?

In other words…

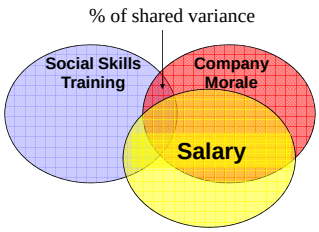


Controlling for temperature…



Are ice cream sales related to violent crimes when we control for temperature?

OR...



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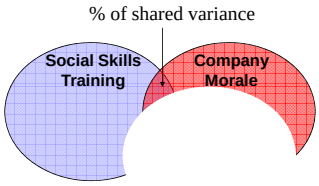

Does social skills training affect company morale when we control for salary?

Some Things to Consider

- A lot of the time, you are not interested in the BEST causal variable
- Instead, you want to show that your program or intervention has an effect over the usual causal variables
- If your IV explains a significant amount of variance in the outcome controlling for the amount explained by covariates, then you have good reason to implement the program or intervention

A Word of Caution

- It's tempting to control for a lot of covariates, BUT…
- The more covariates you add, the less variance is available for your IV to explain

Multivariate Analysis &

- Most multivariate analyses incorporate this "controlling for" concept
- Sometimes you are controlling for covariates and sometimes you are controlling for other IVs or predictors
- "C" in ANCOVA or MANCOVA means they are examining cause-effect associations while accounting for the influence of Covariates