Quantitative Research

Background

Purposes:
- discover generalizable rules governing a system

Research Paradigms:
- (post-)positivist

Structures

experimental	sampling and assignment are random, manipulation of a variable
quasi-experimental	sampling or assignment are pseudorandom
non-experimental	no manipulation of an independent variable

Variable Types:
- **observable variable:** relevant and measurable
- **latent variable:** relevant, but not directly measurable
- **proxy variable:** measurable substitute for latent variable

Sampling and Data Collection

Sampling Techniques

Nonprobability Techniques	Probability Techniques
don't use randomness	*use randomness*
• convenience sample • volunteer sample • intercept sample • purposive sample	• simple random sampling • systematic sampling • stratified random sampling • cluster sampling

Collecting Data:
- **surveys:** evaluation of experiences or opinions of a group of people via questions
- **questionnaires:** a collection of written or printed questions with an answer choice; factual

Statistics

Descriptive Statistics: describes what is present or what exists
- distribution, measures of central tendency *(mean, median, mode)*, spread

Inferential Statistics: draws inferences from a sample to make a claim about the population
- estimating a parameter, comparing groups *(expanded below)*, making predictions

Comparative Quantitative Research Questions

determine if 2+ groups show meaningful differences for a measurable trait

- **Null Hypothesis** (H_0): believed to be true unless it can be shown to be incorrect beyond doubt
- **Alternative Hypothesis** (H_a): a claim about the population that is contradictory to H_0
- **evidence threshold** (α): reasonable doubt; standard to meet to reject H_0
- **p-value:** likelihood of the observed outcome *(Reject H_0 if $p < \alpha$. Fail to Reject H_0 if $p \geq \alpha$.)*
- **power:** probability of making a correct decision
- **Type I Error:** false positive *(Reject H_0 when H_0 is actually true.)*
- **Type II Error:** false negative *(Fail to Reject H_0 when H_0 is actually false.)*

Quality Considerations

Reliability: how consistent and replicable are the measurements yielded by the instrument?
- **stability:** same instrument yields same results form same respondent at different times
- **equivalence:** two different measures yield similar results from same respondents
- **internal consistency:** how well different, but related, items all measure the same thing

Validity: how accurately does the instrument measure the construct it is intended to measure?